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Electrical World

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Electrical World

New York, Saturday, November 5, 1921

The World's Greatest Exponent of Co-operation

MARSHAL FOCH, hero to the world, has come to America, the welcome and much-loved guest of all our people. While he is here and we are reading daily of his travels and his entertainment, it will be well to think a bit of what this great man stands for. And a word will say it.

Foch is the greatest example in history of what a man can do by co-operation. Four great nations and many smaller ones fought against the German Empire and could not prevail so long as the great armies of France and England, Italy and America made their own plans and carried on the war in their own way. But when the mind of Foch was given power over all, his brilliant military genius organized the many millions into one great weapon and he battled with it and he won. Absolute order and singleness of purpose did it. Foch conquered when he compelled the forces of the world to work in complete co-operation. And it is interesting to know that our own General Pershing was the first to suggest Ferdinand Foch for the supreme command, soon after he arrived in France.

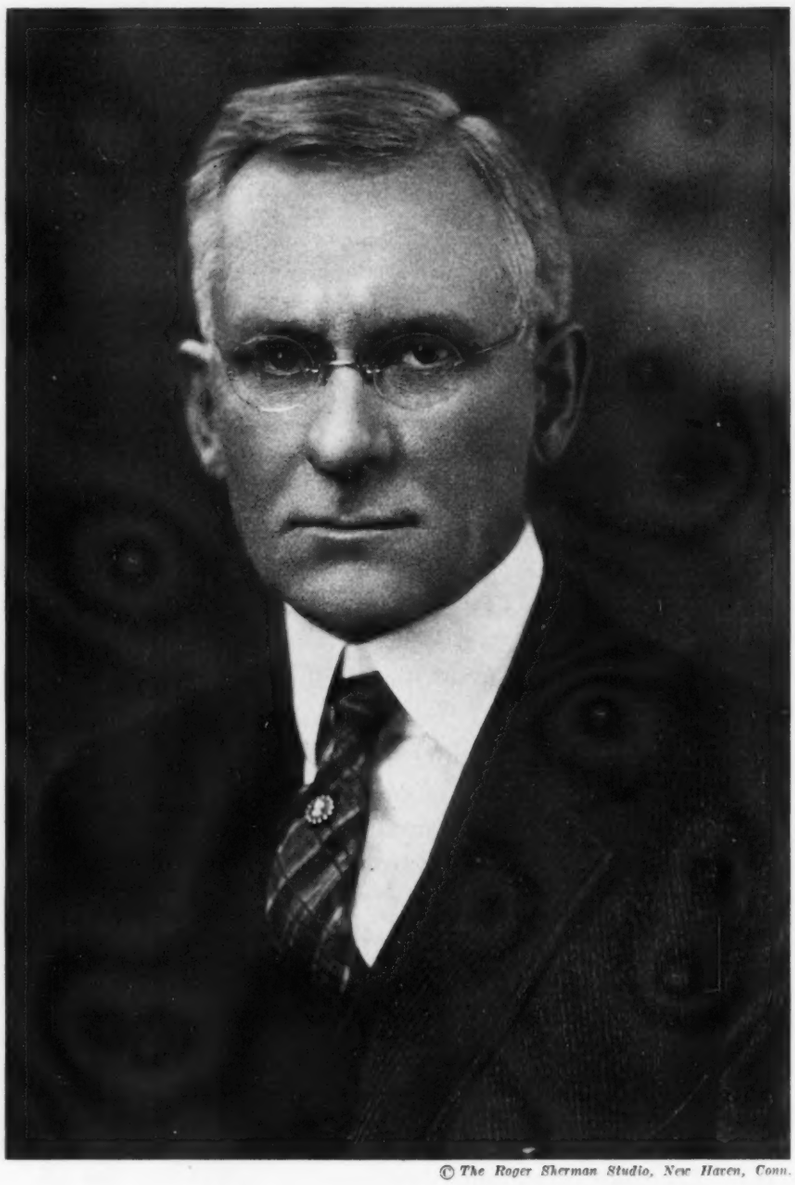
It is a lesson that should dominate us all our days, in all our doings, we who did hang upon the hours and watch while Foch was fighting for our lives. For this idea of supreme command is not a matter just for armies. It is a great principle of living that governs every undertaking where men work together for a common end. It is the underlying law of practical co-operation in which all must obey a single purpose, be it represented in a human leader or in an ideal, if they would measure any great achievement.

We of the electrical industry can well afford, while Foch is here, to think about these things. We, too, have an immense objective—to electrify all industries and to teach all people to provide complete electric service in their homes. But different classes of electrical men continue to make class plans and follow out class purposes. There is no man-figure of a Foch to lead us, and we let our eyes too often wander from that guiding principle which Foch embodies to supreme degree. And so, for all our power and all our progress, the campaign lags and we suffer for the want of a united front and broad co-ordinated purpose.

Too many kinds of electrical men with too many policies and too many associations trying to do the same thing in too many ways are not complete co-operation. We electrical men must think a bit more of the way of Marshal Foch and tie our work together closer so that it may flow on further and faster in one great impelling wave.

Charles Felton Scott

Electrical engineer, inventor and teacher, who, through his versatility and his exceptional ability always to find at least one other method of approach to any problem, has contributed very substantially to the advancement of the science of electrical engineering and to the upbuilding of the engineering profession.



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SOME men are masters of a specialty, others show mediocrity in many things, but to be able to contribute intelligently to a variety of subjects in electrical engineering and allied sciences so that one's opinion is always respected is an exceptional accomplishment. This is, however, the record of Charles Felton Scott, now professor of electrical engineering at Yale University. There is scarcely any field, no matter how small, which forms a part of the general science or the profession of electrical engineering in which Professor Scott has not made some worth-while contribution. From an engineering standpoint, probably his most important contribution has come from his several years of work in inductive interference, although his international reputation began with his invention of the "Scott connection" of transformers.

Born in 1864 at Athens, Ohio, son of the president of Ohio University, he attended that university and later Ohio State University, of which his father had meanwhile become president. He was graduated in 1885 from the latter institution and subsequently took a post-graduate course at Johns Hopkins University. It was while at the Ohio State University, before alternating currents had been more than mentioned commercially, that Professor Scott, in his father's attic tower room, played for hours with a Lissajou pendulum and studied the resulting designs or figures which were traced by the pen. Professor Scott attributes much of his fundamental knowledge of alternating currents to his analysis of these figures, using their physics to interpret alternating-current phenomena.

In 1888 he was employed by the Westinghouse Electric & Manufacturing Company in the testing department, later being transferred to the laboratory, where he assisted Nikola Tesla in his world-renowned work on alternating currents. He was later promoted to be assistant electrical engineer, in 1897 chief electrician and in 1904 consulting engineer. He founded the Westinghouse Club and the *Electric Journal* while with the company. He is one of that group of Westinghouse engineers who have done so much to develop the alternating-current system of electric power generation and distribution and its application to the requirements of present-day industries. In 1911 he accepted the professorship of electrical engineering at Yale.

Professor Scott was connected with the development work on the early Niagara Falls power stations; he had a great deal to do with the electrification of the New York, New Haven & Hartford Railroad; he made inductive-interference studies when the trouble first arose in Indiana years ago, and he has been a consultant on many similar problems since that time. His latest work, as a representative of the Western Electric Company, was in the matter of the location of communication cables in Italy. Beginning with his first activities in the Westinghouse company, he has produced numerous valuable inventions.

Professor Scott was elected president of the American Institute of Electrical Engineers in 1902, he having been the youngest president that association has ever had. It was during his administration that branches of the Institute were formed at the universities, a plan that is now followed by all of the leading engineering societies. He was one of the small group who had the vision which culminated in the erection of the Engineering Societies Building and the Engineers' Club in New York, being one of those who carried on the negotiations with Andrew Carnegie, and was chairman of the building committee. He was instrumental in forming the Federated American Engineering Societies and is a member of its governing body, the American Engineering Council. He is president of the Society for the Promotion of Engineering Education, a member of the technical advisory committee of the N. E. L. A. and is active in the I. E. S., the A. S. M. E. and in various sectional engineering associations.

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A Thought for Those Still Unemployed

EACH week that passes sees winter nearer, and it must not be forgotten that the situation of those still unemployed becomes more critical. The President's conference has pointed the way toward relief. What are we doing as individuals and as an industry to help provide the work? New interests and other problems are apt to blind us to the fact that this obligation still confronts the country. But if the manufacturer, the merchant and the householder do not make it their business to put more men to work, the number of the idle will not diminish and there is the probability that the suffering will increase.

There is no other way. Each man must ask himself what repair work, what construction can be done right now by him; what added benches and machines can be manned in his own plant, if added selling effort is applied to move the product; how many men and women can be set to selling on commission to provide at least a livelihood. There is sustenance for many families to be found in the house-to-house selling of many electric household devices. Who knows how much help could be given in this way?

Loss of Outstanding Canadian Pioneer

CANADA lost one of her pioneers and industrial captains when Frederic Nicholls died. His career was one of the romances of the electrical industry of the Dominion. Starting first as a promoter and operator of electric light and power companies in the Province of Ontario, his genius and enterprise led him into wider fields of electrical endeavor and made him at the time of his death the outstanding figure of the industry in Canada. Besides being for many years the president and general manager of the Canadian General Electric Company, which he helped to found, Senator Nicholls was either president or director or manager of thirty of the largest concerns in Canada, including among them the Canadian Allis-Chalmers, Ltd., the Marconi Wireless Telegraphy Company of Canada, Ltd., the Canadian Sunbeam Lamp Company and the Mackenzie-Mann group of public utilities. His faith in electricity and his vision of the growth and expansion of Canada were marvelous. While others hesitated he never faltered, so that, despite temperamental peculiarities which at times baffled even his best friends, Mr. Nicholls added achievement to achievement. In both public and private life he retained to the last his tremendous capacity for work and his distinguished genius for organization and financing. He was the only Canadian ever to receive the honor of being president of the National Electric Light Association, and operators and manufacturers on this side of the border lament with their Canadian confrères that death has removed him from the scenes where he accomplished so much.

Protection and Prosperity or Cheap Goods and No Money—Which?

WE—the people—must think about the tariff. Because the subject is difficult to understand, the average American has long refused to bother his head over it. It has been left almost entirely to Congress. But times have changed. The depreciation of foreign currencies and the distortion of former foreign trade relationships have brought new conditions that are rapidly becoming a grave menace to the industries of this country. And it is time that every man knew his mind on the subject of the protective tariff and the American valuation plan.

The purpose of the tariff is clear-cut—to protect existing American industries and the American workingman from unmeetable foreign competition. The passing of the Underwood tariff bill late in 1913 would have gradually flooded this country with imported goods on sale at prices less than they could be made for here. But the war interposed. Now that European peoples are getting back upon their feet they are beginning to invade our markets with competing goods made of materials and by labor so cheap in comparison with ours that we cannot possibly sell against them in our own land. Already some of our industries have been partially paralyzed. Others are in danger.

To cite a few: The glove manufacturers in New York State have gradually laid off 60 per cent of their labor because they cannot meet the competition of French gloves. Our lace industry, which is scattered through the Eastern cities, is now making only grades of lace not made abroad and is working about half time because Irish and Belgian lace have completely absorbed the market here. The toy manufacturers in Connecticut, Philadelphia and Chicago reported in August only half as many hands at work as the year before because German toys have undersold them. Several glass works in New Jersey have recently closed down because foreign glass is now much cheaper than their own. Electrical manufacturers of many classes are beginning to feel the knife-cut of German and Japanese goods which are now beginning to come in, made for this market and sold here at prices below our factory costs.

What are we going to do about it? There is only one thing *to* do. We must protect our own industries with a tariff that will allow competing foreign goods to come in freely, but at a price balanced to our own. For it does us no good to have cheap imported goods to buy if our factories are closed down, our labor has no work, our business is flat with depression, and nobody has free money to buy these cheap things with. Far better pay according to our own standards, with factories busy,

and the country prosperous, so that we all have money to spend. There is the simple sense of it.

American industries paying the American wage cannot prosper if they must meet foreign competition without a protective tariff. We—the people—must make up our minds which we prefer—protection and prosperity or cheap foreign goods and no money to buy them with. We must decide for ourselves and make our wishes known. The facts are clearly and convincingly presented in this issue by a recognized authority on tariff subjects.

Electrical Development and Politics Impossible Team Mates

AN ORGANIZATION or business subject to abrupt changes in policy is from the very nature of things doomed to failure. There is perhaps no single thing that stands out more prominently in American business life today than the fact that those great business institutions which have made outstanding successes have been those institutions that have well-defined policies of long standing. Of all the industries in which America is today engaged the one which is most delicately susceptible to policy control is the electrical industry, particularly in its public service branch. Picture, then, a business of this sort subject to the whims and caprices of each incoming and outgoing political administration, and a conception will be obtained of what is proposed in the so-called five-hundred-million-dollar water-power enactment to be placed upon the initiative ballot of November, 1922, in California. This proposed enactment, in the nature of a constitutional amendment, is designed to put the state's resources to the extent of $500,000,000 back of a bond issue for the development of California's water-power resources. It proposes that a board of five men appointed by the Governor every four years shall have full control of this expenditure. Should the principal or interest be insufficient from the sale of power, the board has the right to draw upon the state's treasury to meet such emergencies, and even to add to the tax burden of the state in sufficient degree to meet the situation should funds in the treasury be insufficient. Such a board would supersede in autocratic authority the Governor and the Legislature

There are many other sections in this proposed enactment that are of more than doubtful economic advantage. Allusion will be made to only one. If there is one thing that has proved true in the electrical industry above all else, it is that duplication of physical installation is unscientific and ruinous. The proposed enactment would, with no regard whatsoever to this great economic law, allow the board to go through the state and set up municipally owned or district-owned hydro-electric generation and transmission systems. Electrical development as a whole has created one unfortunate viewpoint. In the public mind the dazzle, inspiration and accomplishment of its past have established the belief that, since electric service is a basic element in modern industrial development, electrical construction projects can be undertaken on a vast scale with little if any regard for the basic economic laws involved. The public mind and particularly those charged with political responsibilities have yet to learn that if there is any one industry that must proceed along sound economic laws of development and service, it is the central-station industry, for here is found a service institution where business is just business with no political appendages.

Superpower Report Reveals Electrical Opportunities

THE tremendous activity of war industries along the Atlantic seaboard between Boston and Washington resulted in such an exhaustion of power in that section that the necessity of a thorough investigation of the situation was apparent. Obviously no broad or well-founded engineering judgment on future requirements could be based on anything less, and after some persuasion Congress was moved to appropriate the necessary funds to the United States Geological Survey, which was authorized to undertake the work. The report of the survey made by W. S. Murray and others has just been made public, and a very creditable report it is. It indicates the enormous savings in labor, material and money that might be effected by the installation of a power system adequate to serve all industry in the district surveyed, and suggests that the existing public utilities act in complete co-operation and adopt a plan of co-ordinated interconnection and expansion to bring the savings about. This they should do, if for no other reason than self-interest, as unquestionably they are the only instrumentalities through which maximum economy in the production of electrical energy can be attained.

The report as a whole is an unqualified indorsement of the modern central-station system of electric generation, transmission and distribution, and the pity of it all is that the study was restricted to so small a section of the country. Certainly the subject of power production is big enough and important enough to warrant a complete survey of the entire United States by the government. Future construction will undoubtedly be along the lines of recent evolution; for the best economy, and therefore the highest national benefit, will result from the erection of large central stations of the superpower-plant type, supplemented by hydro-electric resources where these are found to be efficient and economical, all interconnected by a vast transmission network. Such indeed is the plan proposed by Mr. Murray and his fellow engineers.

It would be hard to pass judgment on the predictions made in the report, particularly as no attention was given to legal and financial questions. The engineers, however, sought out and set in order many vital facts for which the industry should be thankful. There are, for example, no less than 96,000 individual plants in the district which might be supplied with electric service at an annual saving of $190,000,000. By 1930 the estimated energy requirements of the zone will be 31,000,000,000 kw.-hr., and this tremendous output will be generated at a saving of $230,000,000 annually over what it would cost with an unco-ordinated system. The opportunities for business in the districts surrounding Providence, New York, Newark, Wilkes-Barre, Pottsville and Philadelphia will doubtless be of immense interest to the public utility operators in those localities, and they are only a few of the constructive conclusions with which the report abounds.

On the showing there is every reason for optimism. The potential public utility business is immense, greater perhaps in the district surveyed than anywhere else in the country, and should give encouragement and cheer to the existing utilities. It is unthinkable that they should let the opportunity for wider and more intensive service slip or tolerate hindrance from legal or financial handicaps. The survey reveals the opportunity and points the way to its realization.

Golf at Present-Day Conventions

ALL MODERN conventions are divided into three parts—meetings, sitting around and golf, or golf, meetings and sitting around, according to the temperament and inclination of the man. Each has its place, and it is hard to say which is the most important, for the purpose of a convention is to provide an opportunity for men to meet and exchange experience and ideas. Some kinds of ideas and experience come out in meetings, some in corner conversations, some in golf. And all are so valuable that it is a pity that golf and meetings should so often be scheduled in competition with each other, so that men who go for both should be compelled to sacrifice one or the other.

It has come to be a condition that convention meetings are poorly attended. Valuable papers are read before a handful, and half the possible discussion is lost because so many men are on the links. They are there because they want to talk and play with other men whom they have come to the convention to meet. The responsibility lies with the makers of the program. Golf should be scheduled with as much consideration as a meeting. Meetings should not be put into direct competition with golf. Morning and evening meetings, with the afternoons open for golf and conversation, have proved a very practical arrangement.

Measuring Kilovolt-Ampere Demand

MUCH of the power-factor trouble which electric service companies have experienced has been due to the fact that adequate apparatus for measuring power factor has not been available until very recently. In fact, it has taken a great deal of hammering on this particular theme to bring manufacturers to the point of supplying something else than the "standard" metering equipment known for some years back. In the current issue of the ELECTRICAL WORLD S. A. Fletcher of the Alabama Power Company gives an account of a scheme for dealing with power-factor difficulties in which a duplex meter is employed. One of the meters records kilowatts in the ordinary way and the other records reactive kilovolt-amperes, each integrating over a fifteen-minute period. The relative readings of the two enable the consumer to get a pretty clear idea of what is happening on his circuit and permit the station to determine with a considerable degree of precision the whole situation as regards kilovolt-amperes and demand.

The apparatus developed for the Alabama case is certainly interesting and ought to do a very good job, but we cannot refrain here from reiterating the opinion we have often expressed that the complication of central-station operation by subsidiary apparatus, with its attendant care and expense, is gradually becoming intolerable. We are particularly pleased to note the appearance of straight kilovolt-ampere meters in both integrating and demand forms, which, if they turn out as well as they can readily be made to turn out, will furnish by far the simplest means of taking the necessary account of power factor. Measuring of demand is obviously not a thing that can be absolutely neglected, but, after all, it is only one of the variables which go to make up the cost of service. If one attempted to measure all these variables, he would not have a central station but an instrument plant on his hands.

Let electric light and power companies get down to the use of the simplest practicable methods of measuring the smallest number of factors with which they can reasonably get along in actual service.

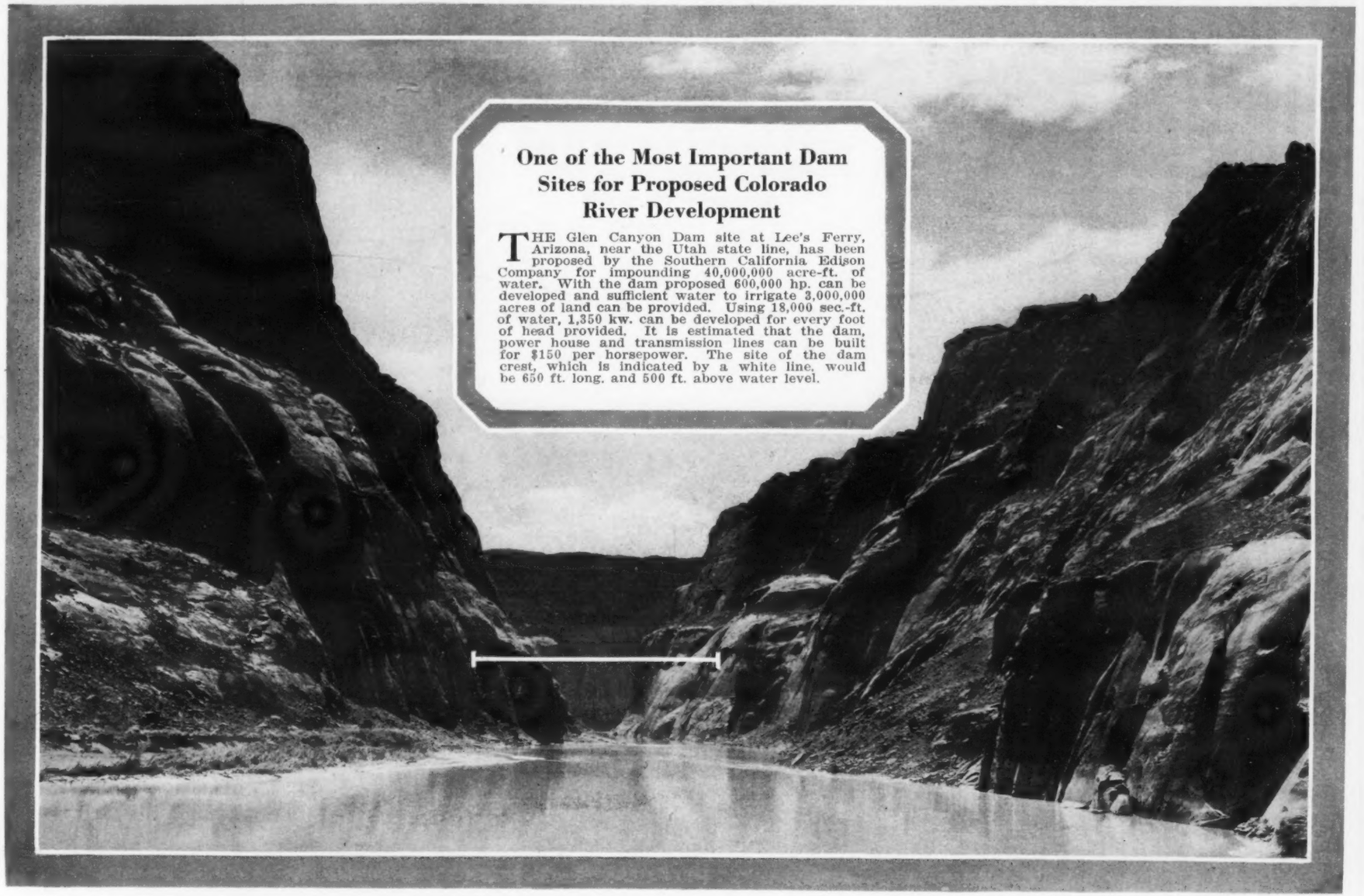
Ownership and Operation of Utilities

ONE of the most noteworthy opinions yet set forth in favor of private ownership and operation of public utilities was presented by a special committee at the recent meeting of the National Association of Railway and Utilities Commissioners. Since 1917 this committee has been studying the subject, and two previous reports have been rendered dealing with its various aspects. The committee stated its conclusions in words of no uncertain meaning when it said: "The foregoing considerations force your committee to the conclusion that the present system of private ownership and operation under public regulation is the logical, just, equitable and best system of conducting the business of public utilities that has been or can be devised to meet the needs and requirements of both the utilities in question and the public by them served."

Moreover, the references to government operation and ownership lay emphasis on sound principles of economy and business efficiency and are a deserving tribute to the operation and service of systems under private management. In pointing out that the business is essentially management and involves, not alone a plant and operating principles, but the functioning of a highly skilled managing personnel, a buying and selling organization, trade connections and the intangible but valuable good will of the public served, the committee has given expression and indorsement to the identical principles which have been laid down by the utilities themselves as the foundation on which they expect their success to be based. M. H. Aylesworth, executive manager of the National Electric Light Association and its spokesman on numerous occasions, has stated this in another way by contending that "public ownership" of utilities as against ownership by cities and states is now an accomplished fact inasmuch as there are more than 1,500,000 people who own securities of electric utilities under private management and indorse the correlation of the business of furnishing electric service with all other lines of business activities which the diversified groups of public utility security holders represent.

On the ever-vital rate problem the following comment of the committee is particularly pertinent: "For the last five years their revenue rates did not proportionately increase with their rapidly increased costs of operations. It therefore follows that, in order to maintain a just, equitable balance and even to keep such utilities out of bankruptcy, it is necessary to maintain their higher rates longer than would to the layman seem necessary judging by the surrounding decline in commodity prices. To follow any other policy would be to put such utilities out of business and to discontinue that service to which the public is so justly entitled and which is now more necessary to the return of the vast bulk of private business to the desired goal of normalcy."

Such an expression brings new hope to electric utilities and can only strengthen the support of commission regulation which they have heretofore universally extended.



One of the Most Important Dam Sites for Proposed Colorado River Development

THE Glen Canyon Dam site at Lee's Ferry, Arizona, near the Utah state line, has been proposed by the Southern California Edison Company for impounding 40,000,000 acre-ft. of water. With the dam proposed 600,000 hp. can be developed and sufficient water to irrigate 3,000,000 acres of land can be provided. Using 18,000 sec.-ft. of water, 1,350 kw. can be developed for every foot of head provided. It is estimated that the dam, power house and transmission lines can be built for $150 per horsepower. The site of the dam crest, which is indicated by a white line, would be 650 ft. long, and 500 ft. above water level.

The Protective Tariff and the American Valuation Plan

A Clear, Detailed Statement of the Reasons Why a Protective Tariff Is Needed in This Country and the Advantages of Assessing Duties Under an American Valuation

By JOSEPH McELROY, 3d
Export Sales Manager Pass & Seymour, Inc.

"THE BEST of all possible governments is that in which the last and least citizen feels he is to blame or to be praised for all the government does. The worst is that in which the largest number of citizens do not think it is any concern of theirs." This was written by Dr. Frank Crane, and it seems to have a particular bearing on the present situation of the tariff. Unfortunately, the subject is little understood. However, the revision of the tariff law is at the moment one of the most pressing problems before the American people. When one reads the daily papers, regardless of their party affiliation, it is difficult to obtain a fair and clear view of this subject. One side of the press leans too far one way and the other side too far in the reverse direction. As to the study and reading of the Fordney tariff bill itself, no one that I have spoken to has read it and all seemed to have formed their opinion from a casual paragraph or column in the daily papers. Yet every man and woman of us is both interested and concerned and should not only understand the present tariff situation but be working steadily to influence the proper solution of the problem. For it is vital to every business and every home.

I have had the pleasure of being a member of a tariff committee representing one of the key industries of the United States (the electrical industry), and I have served for about four years. During this time we have diligently studied the subject of tariff from all angles, not only as it exists in this country but as it exists in foreign countries, and it is distinctly my belief that we must have a protective tariff if we are going to maintain the industries of the United States.

The exports of this country have run from 10 to 20 per cent of the output of the average individual factory. If a tariff is enacted which will protect the 80 or 90 per cent of domestic trade, we shall then also have goods for export and can fight for our share of the trade of the world. But if we look at this tariff situation solely from the export view to protect the 10 to 20 per cent of output now involved—and the factories are compelled to close down because of the influx of foreign-made articles, then eventually we shall have nothing to sell, either for domestic use or for export.

The tariff, however, is not enacted for the protection of manufacturers or capitalists but solely from the viewpoint of the protection of American labor, and the effect of the tariff on labor is best described by concrete examples citing definite products concerned.

In this country, for instance, we have the manufacturer of electric storage batteries, which are used principally on automobiles. This is a young and growing industry, which employs at present approximately 10,000 men in the various plants and about 20,000 additional men in service stations in the country. What are the conditions of this particular industry?

Lead is the chief article employed in the manufacture of electric storage batteries, and in looking at the statistics of the London lead market for a period of fourteen years it is found that the average price is from ½ cent to 1½ cents a pound cheaper than the price of lead in the New York market, which means that under ordinary freight conditions lead could be shipped from Europe to this country and sold in New York at a cheaper price than the lead which is found in our Central Western States. Japanese, German and English labor is cheaper than American labor. Therefore, if one starts with the fact that the pure metal is cheaper than the same article in America and then adds to the cost of the metal the cost of the cheaper foreign labor, there results a cheaper general cost in these foreign countries, and their manufacturers will undersell the American manufacturers.

IMPOSSIBLE TO COMPETE

California is one of the best automobile states in the Union, with more cars per capita, I believe, than any other state. All of the electric storage-battery manufacturers are in the eastern part of the country and figure that it costs approximately 20 per cent to ship and sell their batteries in California. That is, it adds 20 per cent to their cost. Now they mine lead in Japan at a cheaper price than that of the London market. Their labor is the cheapest in any manufacturing country. Their freight rates are cheaper because of the subsidized Japanese steamers. It is a simple and inexpensive run from Japan to any of the Pacific Coast cities.

If there is not tariff protection for the manufacturer of electric storage batteries, therefore, what is going to become of his business against competition of this kind? It is going to mean that he will have to close down his factory and that 10,000 American workingmen will be thrown out of work, to say nothing of the 20,000 men who are now employed in the service stations. Possibly the latter should not be counted, for they might still continue at work in view of the fact that storage batteries of every make need repairs; but there are at least the 10,000 factory workers to be considered.

Take another case. By the terms of the Underwood tariff bill, which was in effect up to the present year, iron castings not made up into complete articles could be imported into this country at the very low duty of 10 per cent. There is an article made of iron employed in the electrical industry which is never used without

a face plate of some other metal, usually porcelain or glass. The article is not complete without a face plate and yet, according to trade duties and customs, is sold without this plate.

These castings could be made abroad cheaper than they can be made in this country, owing principally to the low price of labor, and the country I have in mind in connection with this particular article is Germany. There was nothing to prevent Germany from sending these castings to this country as parts and having agents in this country purchase the face plates in order to complete these parts and make them into complete articles.

If this had been done, it would have meant the closing down of several large plants throughout the country and the throwing out of employment of at least 500 men in connection with this single small article. Here is proof enough that the tariff is a live, vital matter to every American workingman, regardless of his standing, whether skilled or unskilled, and to every American business man.

THE UNDERWOOD TARIFF AND THE WAR

Those that are opposed to the tariff may raise the argument, "Why is it, if these dreadful conditions exist, that the country was not flooded with merchandise from abroad when the Underwood bill was enacted toward the close of 1913, thereby repealing the Payne-Aldrich law, the protective measure that existed up to then?"

Statistics of imports in some lines had shown an increase in consequence of the lowering of the tariff, and had it not been for the war which started in the early part of 1914 this condition would have been general. As soon as the various manufacturers in the foreign manufacturing countries realized the change in the tariff conditions in this country their salesmen in many industries visited the United States to find out the possibilities of trade. The magnitude of the demand for certain lines of goods had not previously been fully appreciated by them, but it was not long before they began copying articles made here and offering them for sale. It was only the beginning of the war that prevented this business from increasing by leaps and bounds, and the American market would eventually have been flooded with cheap foreign products in many lines but for this one obstacle.

Those who are old enough to remember President Cleveland's administration will recall the fact that many articles were offered at that time for sale at cheap prices, and this particularly applied to clothing. It was possible to purchase woolen clothing made abroad at cheap prices, but people were unable to buy because they were out of employment, and when a man is out of employment he is not very much interested in the price of anything, because if it is offered to him for almost nothing he is still unable to purchase it. On the other hand, if he can keep his job and receive a fair return for his work, he is able to purchase articles even at a higher price as long as the price is reasonable and not what might be called prohibitive. The fact that prices of articles are low does not necessarily mean that we have good times or that people can purchase the articles.

The argument raised by exporters and importers that foreign countries would retaliate in the event of our adopting a protective tariff is answered by the fact that the leading European countries are now leaning toward higher tariff, according to reports received recently. In great Britain the safeguarding of the British industries bill is believed to herald a modification of the free trade policy. In France an important increase in customs duties has been announced, and new protective tariffs there are also in Italy and Spain.

When shipping goods to any of the Central or South American countries, Australia, South Africa, Canada and many other countries, it is necessary to furnish consular invoices for the purpose of establishing the duty to be paid on the merchandise shown on these invoices. If these countries have their tariffs and have their own good reasons for them, this is their own business. It is also the business of the people of the United States of America to protect their interests.

The fact that duty proposed by the Fordney tariff bill is levied on American articles going into the countries I have mentioned does not prohibit their sale, and the fact that duty is levied on imports to this country does not prohibit their sale, but it does tend to equalize the price of the foreign article with the price of the article as made by the American manufacturer. The duty is not high enough to be absolutely prohibitive except in a few instances in certain industries which are vital in case of war or other public necessity and therefore need to be protected very strongly. In most cases the duty is simply an equalizing one to prevent the dumping of foreign goods into this country.

ESTABLISHING THE VALUE

But there is more to tariff making than the mere establishing of the protective principle and the scheduling of the rates. Tariff duties differ in their application. "Specific" duties are based upon quantity, so much per pound, yard, cubic content, or other measure, and there is no great difficulty in determining the amount of any specific duty. It is not practicable, however, to attempt to impose all duties without regard to value because a certain specific duty might be too low on a given quantity of merchandise having a high value, whereas it might be too high on the same quantity of similar merchandise having a low value. It is therefore necessary in addition to specific duties to impose duties with reference to value. These duties are known as "ad valorem."

To the present time ad valorem duties in the United States have been imposed generally upon the value of the imported merchandise in the country from which it came at the date of exportation to this country, such foreign value being determined by converting the foreign money representing such value into United States money at the prevailing rate of exchange. It follows therefore that the amount of ad valorem duty imposed under the present and past laws depends upon (1) the rate of duty, (2) the foreign value in foreign money, and (3) the value of the foreign money in United States currency. But at present the moneys of the principal countries of the world have depreciated when compared with United States value, and this change in value of foreign moneys has a direct effect upon the amount of duty collected under any ad valorem duty where it is based upon foreign value. This actual depreciation in the value of the principal foreign moneys is shown below:

Country	Money Unit	Value in U. S. Money July 1, 1914	Value in U. S. Money, July 1, 1921
Great Britain	Pound sterling	$4.88	$3.73
France	Franc	.194	.08
Germany	Mark	.238	.013
Japan	Yen	.501	.481

Take any article produced in all of the foreign countries and imported into this country to be sold in competition with a similar article manufactured here. Let it be assumed that the rate of ad valorem duty on the article is 33⅓ per cent. The comparative value of this article in foreign money and in United States money in 1914 and 1921 would be as follows:

Country	Assumed Value in Foreign Money	Value in U. S. 1914	Value in U. S. 1921
Great Britain, say	10 pounds	$48.80	$37.30
France, say	250 francs	48.50	20.00
Germany, say	150 marks	35.70	1.95
Japan, say	49 yen	24.55	23.57

Since the ad valorem duty is based upon the foreign money representing the foreign value converted into United States money, therefore the amount of duty paid upon any article having these foreign values upon its importation from each of these countries before the war and at present would be as follows:

Country	July 1, 1914, 33⅓ per Cent Duty Amounts to	July 1, 1921, 33⅓ per Cent Duty Amounts to
Great Britain	$16.25	$12.43
France	16.16	6.66
Germany	11.90	.65
Japan	8.18	7.85

Where ad valorem duties are imposed upon foreign values, as at present, the amount of duty consequently decreases in direct proportion to the value of the foreign currency as compared with the value of the currency of the United States. This means that the manufacturer gets the least protection against that country whose currency is the most depreciated. The greater the depreciation in currency the less the duty and consequently the less protection afforded the manufacturer in this country. There is no way to provide against this automatic reduction in duty due to depreciation of foreign currency if ad valorem duties are based upon foreign values measured in terms of foreign moneys converted into United States currency as under our present law.

How American Valuation Helps

It is therefore proposed by the American valuation plan that the domestic value of imported articles shall be the price at the time of exportation of the imported merchandise at which similar domestic merchandise packed ready for delivery in the principal markets of the United States is sold or freely offered for sale to all purchasers in such markets in the ordinary course of trade and in the usual wholesale quantities. Translated into ordinary workable English, this means that the foreign merchandise would pay duty at the value of similar articles as made in this country, and the merchandise would pay the same amount of duty regardless of the country from which it was imported and regardless of the foreign cost. It does not mean that there would be any change in the amount of the duty charged because the amount of any ad valorem duty depends upon the rate of duty and the assessed value of the merchandise upon which the rate is applied.

The American value of goods here being greater than the foreign value of similar goods abroad, owing to the difference in cost of production, it follows that if a certain duty is to be realized the rate would be less if based upon American value than it would be if based on foreign value. This matter has been carefully considered and worked out in the Fordney tariff bill now pending. The rates are based upon American value. If the duty imposed is too high or too low in any particular instance, it is not because of the substitution of American value, but because the proper rate has not been applied. If the proper rates have not been applied, there can be no intelligent criticism of the bill, so far as concerns the amount of ad valorem duty.

Under the American valuation plan merchandise imported from countries whose production costs are low is subjected to the same ad valorem duties as similar merchandise from other countries having higher production costs. This is as it should be. There is no sound reason for imposing less duty on goods from China, for example, than upon similar goods from France. The labor costs in China are much less than they are in France, and Chinese goods selling in this country in competition with French goods can be sold at a greater profit. The greater the profit, the greater the ability to pay the tariff or duty.

The Reaction on Retail Prices

The American valuation plan also tends to lower retail prices. At this time we feel that retail prices are high compared with wholesale prices, the prices of goods manufactured and of raw materials. By imposing our ad valorem duties upon the American wholesale value we educate the American people as to wholesale values. If the people know the wholesale value, they will have some conception of what the retail price ought to be. This should have a tendency to adjust retail prices to the benefit of the American consumer.

Many complaints have been lodged against the present method of imposing ad valorem duties because of the undervaluation abroad of the imported merchandise. There is no way to determine whether the foreign value claimed by the importer is correct except by foreign inquisition, or, in other words, by taking evidence concerning such foreign value in the foreign country whence the goods are imported. But it has been found extremely difficult to obtain adequate facts concerning foreign value. This country has no jurisdiction to compel foreign witnesses to give testimony concerning such value. It is beneficial to the foreigner to make the value as low as possible in order to have the goods take the lowest duty. The result has been that merchandise imported to this country has been grossly undervalued for the purpose of ad valorem assessment.

The American value, on the other hand, can be determined in this country from the testimony of impartial witnesses and our own officials will have jurisdiction to get at all the facts. It follows that this country would be in a much better position to ascertain actual value for the purpose of assessment of ad valorem duties under the American valuation plan.

I know of no other adequate means of insuring fair and equitable ad valorem duties under the present existing exchange condition. Unless the American valuation plan is adopted there is little hope of the American manufacturer and American labor getting adequate protection against foreign-made goods, and there is little hope of this country being put in a position to maintain the present standard of living of the American workingman and workingwoman. For all of these reasons I believe it is necessary that citizens everywhere should investigate this subject and realize that it is something which vitally affects their future and their present method of living.

Advantages of Superpower System

W. S. Murray in a Report to the Government Enumerates the Immense Savings Possible by Supplementing and Co-ordinating Existing Utilities and Increasing Their Economies

THE United States Geological Survey, Department of the Interior, has just issued the report of W. S. Murray and others on "A Superpower System for the Region Between Boston and Washington." This special short-period study of the source of energy along the North Atlantic seaboard was begun on July 1, 1920, and completed within a year. An appropriation of $125,000 was made by Congress for the purpose of the survey, and $26,000 additional was contributed by utilities and industries in the Superpower Zone.

The superpower scheme comprehends a plan of power production that includes the generation of electricity in steam stations at tidewater and on inland rivers where a sufficient quantity of water for condensing purposes is available, and also the utilization of all hydro-electric power that can be economically obtainable within the zone or within transmission distance of it, the whole to be tied together through an interconnected system of transmission lines.

Fig. 1 shows the Superpower Zone. It lies between the thirty-ninth and forty-fourth parallels of latitude and extends from the coast approximately 150 miles inland, embracing parts of the States of Maine, New Hampshire, Vermont, New York, Pennsylvania, Delaware and Maryland and all of the States of Massachusetts, Rhode Island, Connecticut and New Jersey. Within this zone is concentrated one-fourth of the population of the United States, and within it are operated, most of them independently, 315 electric public utilities, eighteen steam railroads and 96,000 industrial plants.

The purpose of the study was to show the saving in labor, material and money that might be effected by the installation of a power system adequate to serve the railroads, municipalities, utilities and the industries in the Superpower Zone. There is no thought that this system should seek to supplant or even to compete with the existing electric public utilities. In fact, the idea of the Superpower System is to co-ordinate and supplement these utilities so as to carry to a higher degree the economies incident to their present operation.

The legal and financial aspects of the superpower project are not touched on in the report for the reason that it was deemed inopportune without further consideration to formulate any conclusions on these important matters. The problem set for the engineering staff was that of determining the total amount and the location of the power load that would be required for private, municipal, industrial and railroad purposes at a date sufficiently in advance to permit the construction of a system of the highest economy to supply it. The date chosen was 1930, and the allocation of the load and the power-generating facilities for the six geographical divisions of the Superpower Zone forms a most interesting part of the report. In determining the amount and location of the load, the electric public utilities, the railroads and the industries within the zone lent their co-operation.

The conclusions reached by Mr. Murray are necessarily largely based on the special studies made by the members of his engineering staff. These studies appear as appendices to the report and are as follows:

Appendix B—"Electric Utilities in Independent Operation in the Superpower Zone in 1919," by L. E. Imlay, T. B. Rutherford and others.

Appendix C—"Proposed Electrification of Heavy-traction Railroads in the Superpower Zone," by C. T. Hutchinson, N. C. McPherson and others.

Appendix D—"Industry in the Superpower Zone," by H. W. Butler, H. Goodwin, Jr., and others.

Appendix E—"Performance and Cost of the Superpower System," by Henry Flood, Jr., A. R. Wellwood and others.

FIG. 1—SUPERPOWER ZONE WHICH EMBRACES 558 ELECTRIC UTILITY PLANTS

Appendix F—"Steam-electric Plants for the Superpower System," by Henry Flood, Jr., and others.

Appendix G—"Hydro-electric Plants for the Superpower System," by L. E. Imlay, L. A. Whitsit, B. J. Peterson and others.

Appendix H—"The Superpower Transmission System," by L. E. Imlay.

Appendix I—"Reliability of Service," by L. E. Imlay and others.

Appendix J—"The Relation of Coal and Coal-Delivery Routes to the Superpower System," by C. E. Lesher, F. G. Tryon and others.

Appendix K—"Use of Process Fuels and Pulverized Coal for Base-load Steam-Electric Plants," by O. P. Hood and others.

Appendix L—"Basic Costs," by the engineering staff.

Appendix M—"Stations and Transmission Lines of Electric Power Companies Engaged in Public Service," by A. H. Horton.

SUMMARY OF CONCLUSIONS

The market for superpower energy will be furnished by the electric utilities, the industries and the railroads. The estimated requirements for energy supplied through

the electric utilities for municipal, private, industrial and railroad purposes in 1930 is 31,000,000,000 kw.-hr. This energy could be supplied by a co-ordinated power system at an annual cost of $239,000,000 less than by an unco-ordinated system such as is now in use. The total investment in generating and transmission facilities for the Superpower System will be $1,109,564,000, of which $416,346,000 will represent the value of existing facilities to be incorporated into the system.

A study of the 96,000 manufacturing establishments operating within the Superpower Zone shows that by 1930, through the maximum economical use of purchased electric energy, they can save $190,000,000 annually above the fixed annual charges against a capital investment of $185,000,000 to provide the motor equipment necessary to receive and use this power.

The combined capital investment necessary for the electric utilities and the industries as of 1930 therefore amounts to $1,294,564,000, and this total investment will yield annually above the fixed charges the sum of $429,000,000, or 33 per cent on the investment.

Within the Superpower Zone there are 36,000 miles of railroad measured as single-track—that is, including each track of main lines, yards and sidings. Of this total about 19,000 miles can be profitably electrified, so as to yield by 1930 an annual saving of $81,000,000 as compared with the cost of operation by steam. The capital expenditure necessary to electrify the 19,000 miles would be $570,000,000, and the average return upon the investment would therefore be 14.2 per cent.

The order in which the superpower steam-electric and hydro-electric power plants and transmission systems should be constructed must depend (1) on the present industrial demand for energy that cannot be satisfied because of the difficulties of the local utilities in financing extensions, and (2) on the future demand for energy that will result from the more economical generation of power under the Superpower System. It is believed that the quickest return will be obtained by following in chronologic sequence the order of procedure as follows:

1. The construction of a steam-electric plant near Pittston, Pa., to supply a part of its energy to the anthracite division of the Superpower Zone and the remainder to the metropolitan division, particularly New Jersey.

2. The construction of a steam-electric plant near Sunbury, Pa., to supply a part of its energy to the anthracite division, a part to the Reading load center, and the remainder to Philadelphia.

3. The construction of hydro-electric plants on the Delaware and Susquehanna Rivers to supplement the steam plants indicated above.

4. The progressive development of the Hudson River projects to meet the growth of energy requirements at the Schenectady, Utica, Poughkeepsie and Pittsfield load centers.

5. The construction of a steam-electric plant near Boston to supply the Boston, Lowell and Newburyport load centers.

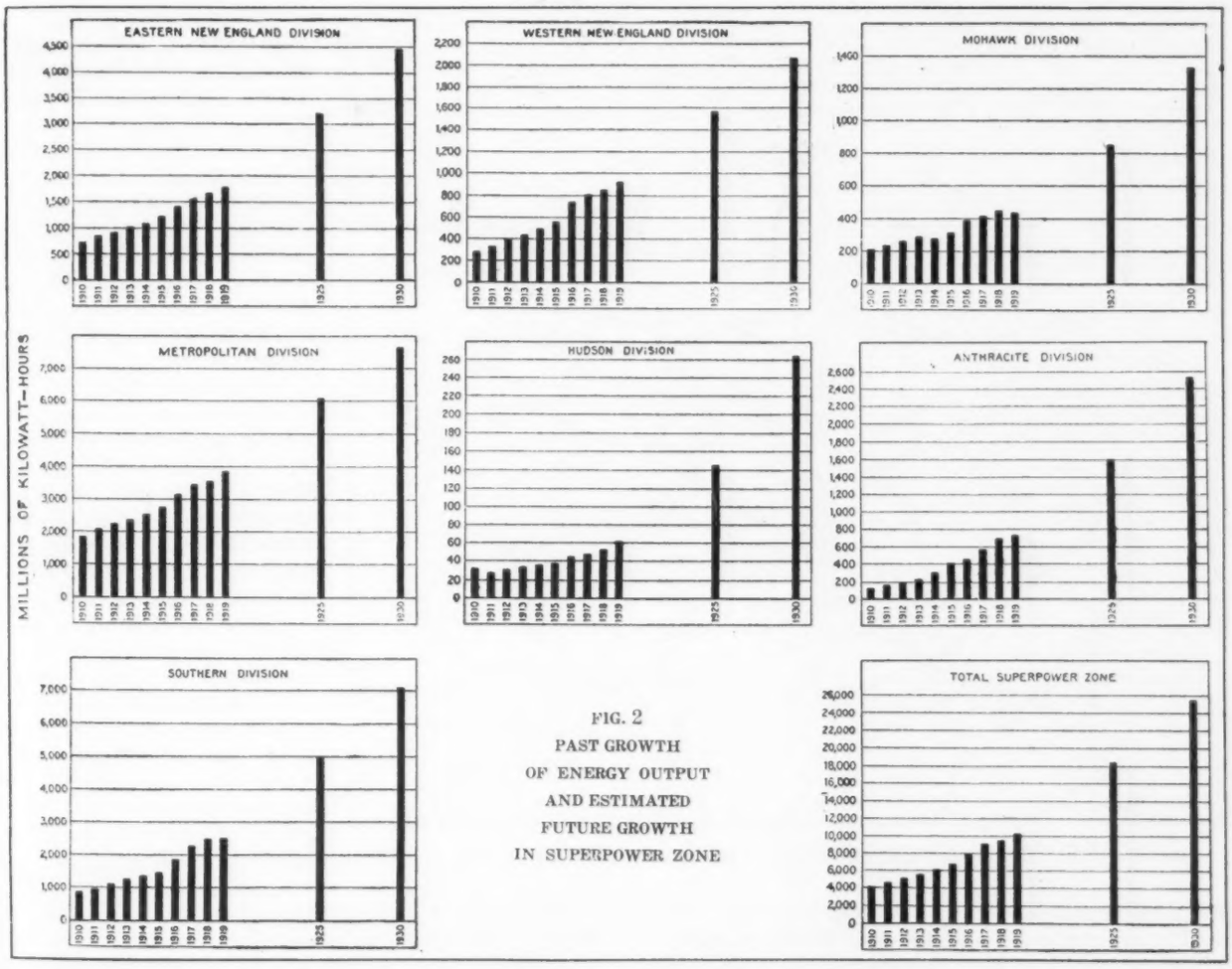


FIG. 2
PAST GROWTH
OF ENERGY OUTPUT
AND ESTIMATED
FUTURE GROWTH
IN SUPERPOWER ZONE

6. The construction of a steam-electric plant near New Haven to supply the New Haven, Bridgeport, Waterbury and Norwich load centers.

7. The partial construction of the first hydro-electric plant in the development of the Potomac River as soon as the power demands of the Baltimore and Washington load centers require additional plant capacity.

Unlike the Pacific Coast region, where water power abounds and industry is relatively small, the Superpower Zone has relatively small hydro-electric resources and maximum industrial-power requirements. When the increases during the last ten years are projected to 1930, even at a lower rate, the total energy requirement of the zone in that year is found to be 31,000,000,000 kw.-hr., of which about 21 per cent can be supplied from water power.

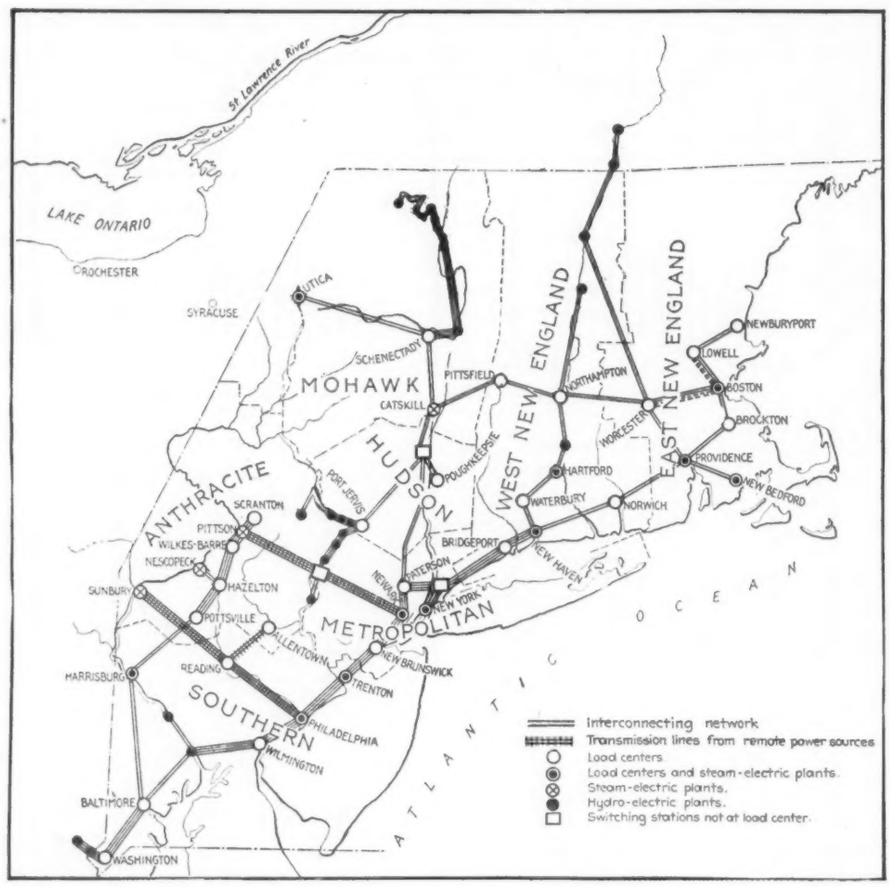


FIG. 3—PRINCIPAL TRANSMISSION LINES AND POWER PLANTS AS THEY MAY BE IN 1925

Fortunately some of the best coal deposits in the country lie near this great industrial territory, and a prime economic purpose should be so to conjoin the hydro-electric supply of power to the steam-electric supply as to produce a maximum of energy for a minimum investment of capital and a minimum operating expense, and at the same time to conserve the rapidly disappearing cheap fuels of the Appalachian coal fields.

Figs. 3 and 4 show how the Superpower System should appear in 1925 and 1930. They give the locations of the new steam-electric plants, the hydro-electric plants and the load centers for each year and show the interconnecting network of transmission systems required. Had superpower been obtainable in 1919, the number of load centers to which its power could have been supplied economically would have been twenty, and this number, as the maps show, will increase to thirty-four in 1930.

Under the present independent operation of the electric utilities and the manufacturing industries in the Superpower Zone the existing power plants are numerous and small. The average capacity of the 558 electric utility plants now in operation in the zone is 7,900 kw. and that of the steam-electric plants 10,000 kw., while the hydro-electric plants average only 2,800 kw. Out of 96,000 industrial establishments in the Superpower Zone 76,000 use power, and each of these isolated plants averages about 350 hp. Under the Superpower System, by contrast, the number of power stations required to supply the entire zone in 1930 will be only 273, of which 218 will belong to the existing electric utilities. The capacity of the base-load steam plants will range from 60,000 to 300,000 kw. In none of these plants will there be installed a turbo-generator having a capacity of less than 30,000 kw.

The new power stations and load centers will be so located with reference to the existing electric utility plants that are to be incorporated in the system as to insure the maximum aggregate economy in power generation and transmission. A prime object to be attained in the superpower plan is the maximum economic utilization of existing generation and transmission equipment.

In the New York, Baltimore and Washington load centers the predominating frequency is 25 cycles; in the remainder of the zone it is 60 cycles.

The electric utility load will grow from approximately 10,000,000,000 kw.-hr. in 1919 to 26,000,000,000 kw.-hr. in 1930. The high-voltage circuits of the Superpower System in general will form ring buses around the larger cities of the zone, in the outskirts of which will be located substations with transformers having their primaries connected to the superpower circuits and their secondaries connected to the existing distribution lines of the electric utilities.

Out of 558 electric utility plants in the Superpower Zone there are but thirty-six whose capacity equals or exceeds the average capacity of the plants for the Superpower System in 1930. Out of the 1,074 generating units of 500 kw. or more operating within the zone in 1919, only about twenty had a capacity greater than 30,000 kw.

A comparison of the production cost for plants greater than 100,000 kw. with that of those less than 1,000 kw. shows a ratio of three to one for cost of fuel and four

to one for cost of maintenance and supplies in favor of the larger plants. With these marked economies in mind, it is clear that base load should be supplied from superpower plants employing units of not less than 30,000 kw. each.

Under independent operation in 1919 the generating capacity required was 46 per cent greater than the annual peak load, and the resulting annual capacity factor was 26 per cent. Under the Superpower System in 1930, through joint reserve, the generating capacity required will be only 9 per cent greater than the annual peak, and the annual capacity factor will be 45 per cent.

The reproduction costs for steam and hydro-electric plants under independent operation as of 1919 is $156 per kilowatt of capacity. The corresponding cost under superpower operation is $125 per kilowatt.

The average unit production cost for the electric utilities in 1919 was 1.93 cents per kilowatt-hour; the cost of the electric power produced by steam was 2.12 cents, and that of the hydro-electric power was 0.94 cent. In the steam-electric base-load plants for the Superpower System the production cost, based upon the same capacity factor that is applied to electric independent operation, will be 0.99 cent per kilowatt-hour, as compared with 2.12 cents.

Within the Superpower Zone there is a large railroad mileage upon which the traffic is sufficiently dense to require careful consideration of the savings to be effected by electrification. The zone contains some 36,000 miles of main line, yards and sidings, of which 19,000 miles could be profitably electrified. The total capital expenditure necessary to electrify this mileage is $570,000,000, and the result of the analysis promises an annual saving of $81,000,000, or 14.2 per cent on the investment.

It is the belief of Mr. Murray that the production of electrical energy should be confined to those in the power business and that the railroads should purchase electrical energy and confine themselves to the transportation business. A further step of fundamental importance would be to standardize as far as possible the motive-power equipment required for the three classes of railroad service—passenger, freight and switching. Such standardization would simplify electrification and therefore reduce the cost of maintaining equipment, as well as lessen the investment cost.

No recommendation is made with regard to direct-current or alternating-current traction other than that the great electric manufacturing companies of this country draw together rather than apart and that they unite in a common specification for electric motive power to replace steam.

The normal amount demanded annually for extensions and betterments for the railroads within the Superpower Zone is approximately $150,000,000, an amount which even in the face of present construction prices would suffice in three or four years to cover the cost of electrifying all the mileage mentioned.

Out of 96,000 individual establishments in the zone, 76,000 used power. The industries analyzed included manufacturing establishments, laundries, mines and quarries and government manufacturing institutions. The analysis showed that in 1919 the equivalent of 9,311,440,000 kw.-hr. was developed by prime movers operated by the industries themselves and that 3,338,800,000 kw.-hr. was purchased. It further shows that it would have been economical to shut down 4,008,200 hp. of prime movers and purchase energy to the amount of 5,623,800,000 kw.-hr., which would have made a total of 8,962,600,000 kw.-hr. purchased in 1919. The saving in coal thus effected would have been 13,502,100 tons—71 per cent of the coal used by the industries for producing power, or 25 per cent of all the coal used by the industries. In making the industrial power analysis care has been taken not to invade the field of what might be termed by-product power—that is, power produced by the industries from coal that would have been burned anyway for heat and in industrial processes. In general it was found that plants which require 500 hp. or less can economically purchase energy.

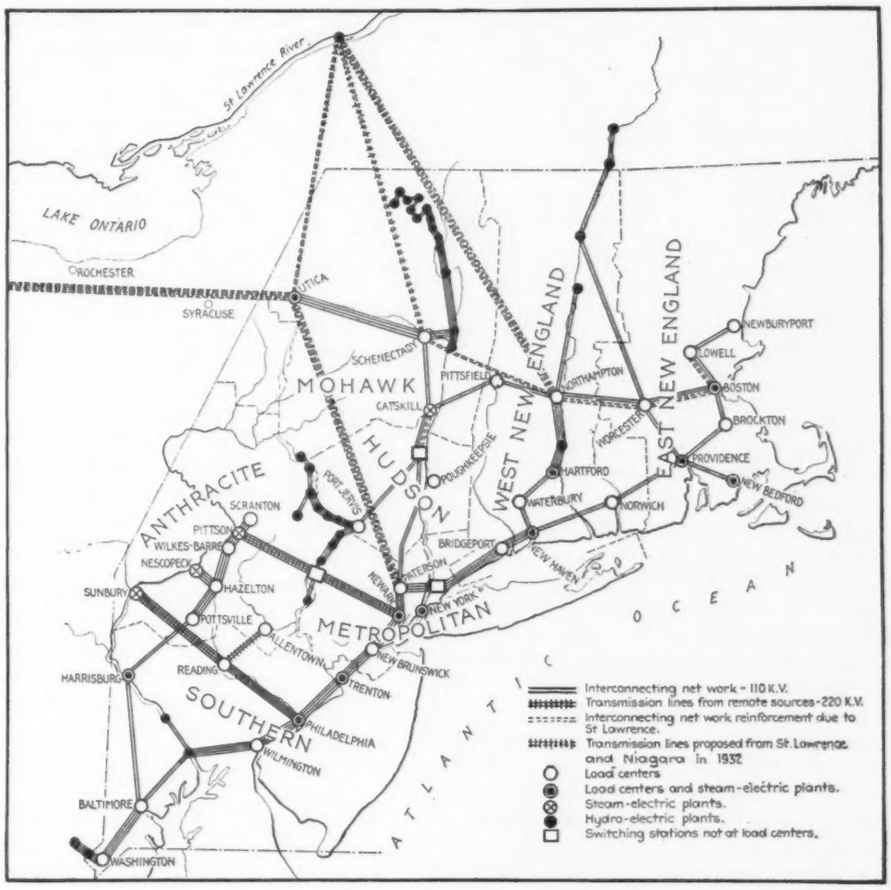


FIG. 4—POSSIBLE POSITIONS OF PRINCIPAL PLANTS AND TRANSMISSION LINES IN 1930

A careful study of the power requirement for industrial establishments in the Superpower Zone has been made and has shown that by 1930 an annual saving of $190,000,000 can be made to the industries themselves above the fixed charges, against an investment of $185,000,000 for the motor equipment necessary to utilize the power.

PERFORMANCE AND COST OF SUPERPOWER SYSTEM

Capacity to provide for load growth has been determined largely from the trend of the load factor. The load factor for the electric utilities within the zone increased from 34 per cent in 1910 to 39 per cent in 1919.

In 1919 only 15 per cent of the total output of the electric utilities was hydro-electric power. By 1930 this proportion will have been increased to 21 per cent. In 1925 50 per cent of the total generating capacity for superpower operation will be contained in plants owned by the present electric utilities, and they will produce about 26 per cent of the energy. By 1930 the corresponding percentage of generating capacity will have dropped to 39 per cent, and these plants will furnish only 18 per cent of the total output. They will be used principally to carry peak load.

Of far-reaching importance will be the maximum use of diversity economy made possible by the interconnecting circuits of the Superpower System.

The unit investment cost in new power plants for the Superpower System is $118.25 per kilowatt of effective capacity; that for all plants is $125 per kilowatt. The unit reproduction cost of the electric utilities in 1919 was $156 per kilowatt of effective capacity.

In 1930 the transmission system of the Superpower System will represent 9.3 per cent of the total investment cost. The new money required for the Superpower System up to 1925 is $453,143,000 and up to 1930 $693,218,000, thus making it necessary to raise $90,600,000 annually for the first five years and $48,000,000 annually for the following five years.

If the demand of 1930 were provided for by the independent systems as constructed today, the total sum required would be $856,000,000, or $85,600,000 a year. Accordingly the construction of the Superpower System will involve a saving in investment cost of $163,000,000 during the next ten years; in other words, the increase of capacity to meet growing demands can be financed by the superpower plan for $16,300,000 annually less than by the normal expansion of the existing electric utilities.

Of great interest is the economic relation established between the joint use of steam and water power. It is shown that steam and water power can be so combined as to yield annually $69,550,000 on an increased investment of only $44,838,000. Here is exemplified one of the prime advantages of superpower production, costs being reduced by means of the interconnecting system, which permits the highest economy in steam-produced power together with the maximum use of water power.

The load growth in the eastern New England, western New England and Mohawk-Hudson divisions should be sufficient to absorb the total available output of the St. Lawrence project by 1932; and the growth in the metropolitan division should be sufficient to absorb 300,000 kw. at a load factor of 80 per cent from Niagara in the same year. Power, Mr. Murray believes, could be purchased from these hydro-electric plants at not over $20 per horsepower-year delivered at their busbars.

The total annual cost for power delivered in 1932 to the load centers of the eastern New England, western New England and Mohawk-Hudson divisions, if St. Lawrence power is used, will be $130,273,000; if the excess energy required in 1932 over that of 1930 were furnished by new steam-electric plants, the cost would be about $141,601,000. The development of the St. Lawrence River would therefore save $11,328,000 a year to these geographic divisions. Moreover, the total investment required to utilize purchased St. Lawrence power would be $24,826,000 less than that required to construct new steam-electric plants to supply this excess energy. In the three divisions mentioned, which lie farthest from the coal fields, the cost of power generated by steam plants is inherently high, and therefore the St. Lawrence development will be of very great benefit to them.

The total cost to the metropolitan division for the power it will require in 1932, if Niagara power is used, will be $107,651,000. If the growth in energy required between 1930 and 1932 were supplied from new steam-electric plants in the metropolitan division, the total cost in 1932 would be $110,899,000, showing an annual saving of $3,248,000 in favor of Niagara power. Were the power purchased from the Niagara power interests, the total investment for 1932 would be $5,080,000 less than that required to generate an equal amount by steam.

The use of the St. Lawrence power as suggested above would save 2,234,000 tons of coal annually, and the use of Niagara power in the metropolitan division as suggested would save 1,204,000 tons of coal annually.

The new power-plant capacity required in the Superpower Zone would be 3,098,000 kw. in 1925 and 4,980,000 kw. in 1930.

The appendix shows that in 1930 the cost of the power produced by the Superpower System, inclusive of fixed charges, as delivered on the buses of the electric utilities, would be 10.6 mills per kilowatt-hour, whereas the cost under independent operation as of 1919, exclusive of fixed charges, would be virtually the same. This, in Mr. Murray's opinion, is the fundamental reason why the expansion of electric utilities should follow the superpower plan.

STEAM-ELECTRIC PLANTS FOR THE SUPERPOWER SYSTEM

The capacity of the existing plants of the electric utilities to be retained in the Superpower System is 2,677,000 kw., which represents 79 per cent of the effective capacity of the steam-electric public utilities in the Superpower Zone in 1919. The reproduction cost of these plants is $329,219,000.

The performance of the retained steam plants shows that these should average about 2.15 lb. of coal per kilowatt-hour, as against 2.73 lb. per kilowatt-hour for all electric-utility steam plants operating in the zone in 1919, when both groups are operating at the same annual capacity factor.

The average size of the steam plants retained is 44,600 kw., and the reproduction cost as of 1919 is $124 per kilowatt, as against $109.50 for new steam plants as of 1930. After consultation with many representatives of manufacturers in all parts of the country and with designing and operating engineers, the following operating characteristics for base-load steam plants were determined:

Steam pressure at turbine throttle, 300 lb. per square inch.

Superheat at turbine throttle, 230 deg. Fahr.

Final temperature at turbine throttle, 652 deg. Fahr.

Vacuum at turbine exhaust, 1 in. of mercury, absolute.

The proposed new steam-electric plants have been so located as to obtain the fullest advantage of low freight rates, easy coal-delivery routes and ample condensing water. Fourteen new steam-electric plants, aggregating 2,520,000 kw., will be required by 1925, and four additional plants, or eighteen in all, aggregating 3,930,000 kw., by 1930. The total for 1925 is equivalent to 63 per cent of all the present steam-electric generating capacity, and that for 1930 to 98 per cent.

In the anthracite division base-load steam-electric plants, using buckwheat No. 3 coal, can be operated most advantageously because of the combined use of their power for the metropolitan and Southern divisions. The diversity between these divisions and the anthracite division will permit operation at a capacity factor of 75 per cent, and under these conditions electric energy can be produced in 1930, inclusive of fixed charges, at 5.7 mills per kilowatt-hour. This figure is sufficiently low to permit the additional fixed charges on transmission for the power sent to the tidewater region.

There are three steam-electric power-station sites in the anthracite region—one near Pittston, one near the mouth of Nescopeck Creek and one near Sunbury, all in Pennsylvania and all on the Susquehanna River—at which sufficient condensing water is available to permit the development of 300,000 kw. each.

The principal rivers which can contribute water power to the Superpower Zone are the Potomac, Susquehanna, Delaware, Hudson and Connecticut. It is proposed to utilize power from them in 1930 to the following extent:

	Capacity Kw.	Output (Millions of Kw.-hr.)	Investment	Production Cost (Mills per Kw.-hr.)
Potomac	200,000	950	$22,000,000	3.36
Susquehanna	185,000	1,230	28,000,000	3.22
Delaware	350,000	1,250	51,500,000	5.95
Hudson	150,000	900	38,350,000	5.84
Connecticut	165,000	760	29,000,000	5.45

It is proposed to develop these rivers above their primary power capacity for peak-load operation.

The water powers of the Niagara and St. Lawrence Rivers are within transmission distance of the Superpower Zone, but on account of the time required for construction on the St. Lawrence and of the treaty restrictions concerning the use of the water at Niagara Falls the power from these sources has not been considered available in the zone prior to 1930.

Under present construction and operating costs power purchased at Niagara or on St. Lawrence River at $20 a horsepower, ready for transmission at those points at potentials of not less than 220,000 volts, can be placed at Utica and Schenectady, N. Y., and at Northampton, Mass., for 4.6 mills per kilowatt-hour, and at Paterson, N. J., for 5.7 mills. These figures assume purchases of not less than 300,000 kw. delivered at a load factor of not less than 80 per cent.

The reproduction cost of the 451,500 kw. of existing hydro-electric capacity within the zone is $87,127,000. The new hydro-electric capacity which should be installed by 1930 will bring the total capacity up to 1,501,500 kw., of which the old plants will represent 30 per cent. In 1930 the total hydro-electric investment will be $245,977,000, old plants representing 35 per cent.

So far as the existing electric utilities are concerned the Superpower System begins and ends at their power-station buses, and so far as the new superpower plants are concerned it begins at these plants and ends on the buses of the existing electric utilities.

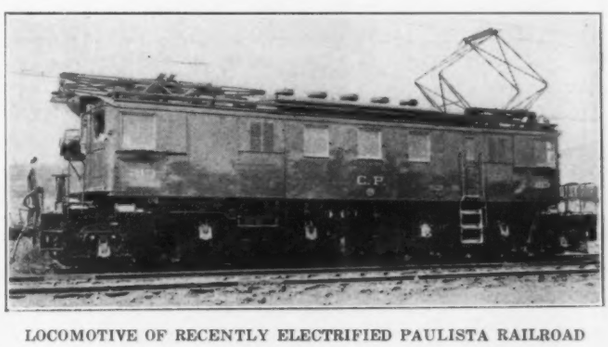
The existing transmission systems of the electric utility companies, which comprise about 1,200 miles operated at 33,000 volts or higher, will become distribution rather than transmission systems, and they will of necessity require expansion to distribute the additional power delivered to them from the Superpower System. The transmission features of the Superpower System will therefore have to do only with the transmission of power from the new plants to load centers and to the buses of the existing electric utility plants.

In 1930 the Superpower Transmission System should consist of 970 circuit miles of 220,000-volt lines and 4,696 circuit miles of 110,000-volt interconnecting lines. To these lines will be connected 5,600,000 kva. of transformer capacity, not including the transformer capacity in the base-load steam-electric plants. The construction of the transmission systems for the St. Lawrence and Niagara developments will add 3,140 circuit miles of 220,000-volt lines and 1,824,000 kva. of transformers. Thus potentials of not less than 220,000 volts will be selected to transmit power from plants that are at considerable distances from the general interconnected superpower plants, and within the zone a potential of not less than 110,000 volts will be employed for interconnection between power and load centers.

Railway Electrification in Brazil

THE Companhia Paulista de Estradas de Ferro is about to begin electric operation over a 44 km. section of double track on its main line between Jundiahy and Campinas, Brazil. This marks the initial step in what is expected to become a broad program of electrification in Brazil, with the ultimate aim of substituting hydro-electrically developed power for expensive coal. It is probable that eventually the entire broad-gage main line will be electrically operated.

The Westinghouse Electric International Company is furnishing two freight and two passenger locomotives for this initial electrification. The freight locomotives are of the six-axle type, with two six-wheel articulated trucks. There are six axle-mounted motors rated at 280 hp. at the one-hour rating. Each motor



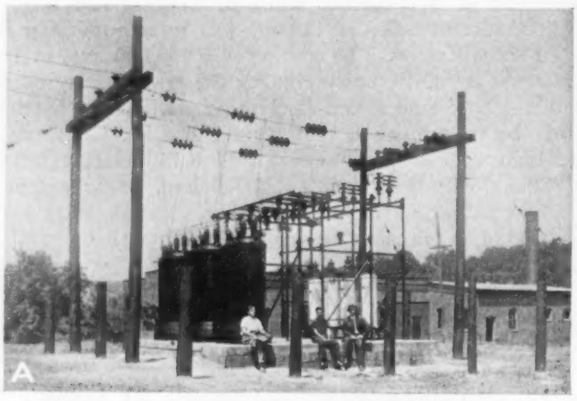
LOCOMOTIVE OF RECENTLY ELECTRIFIED PAULISTA RAILROAD

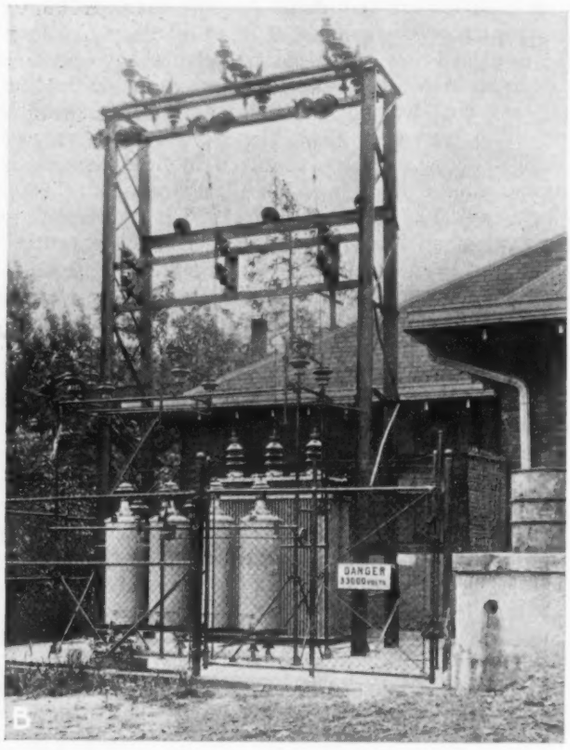
is wound for 1,500 volts for operation two in series on 3,000 volts and is arranged for field control. Each motor drives its axle by a single flexible gear. The passenger locomotives have each driving axle equipped with a 560-hp., 3,000-volt twin motor and quill drive.

This information was furnished by S. B. Cooper, general engineering department, Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.

Outdoor Substations Solve Problem ot Service to Small Communities

KEEPING down the investment in substation equipment is a problem that is always a puzzling one for the company that must furnish service to the small community. Except by care in selection of capacity the cost of transformers, switches, lightning arresters and other electrical equipment varies within very narrow limits and the problem becomes one of eliminating unnecessary items of equipment and utmost simplification of arrangement. These illustrations show how the Middle West Utilities Company has met the problem. A is a 900-kw., 33-kv. outdoor substation at Hoosick Falls, N. Y., reduced to the simplest form. B is an inexpensive steel structure on the property of the Interstate Public Service Company at Edenburg, Ind. C is a splendid example of simple wood structure construction used on the 900-kw., 33-kv. transmission line connecting the Henryetta and Okmulgee plants at Oklahoma.


A



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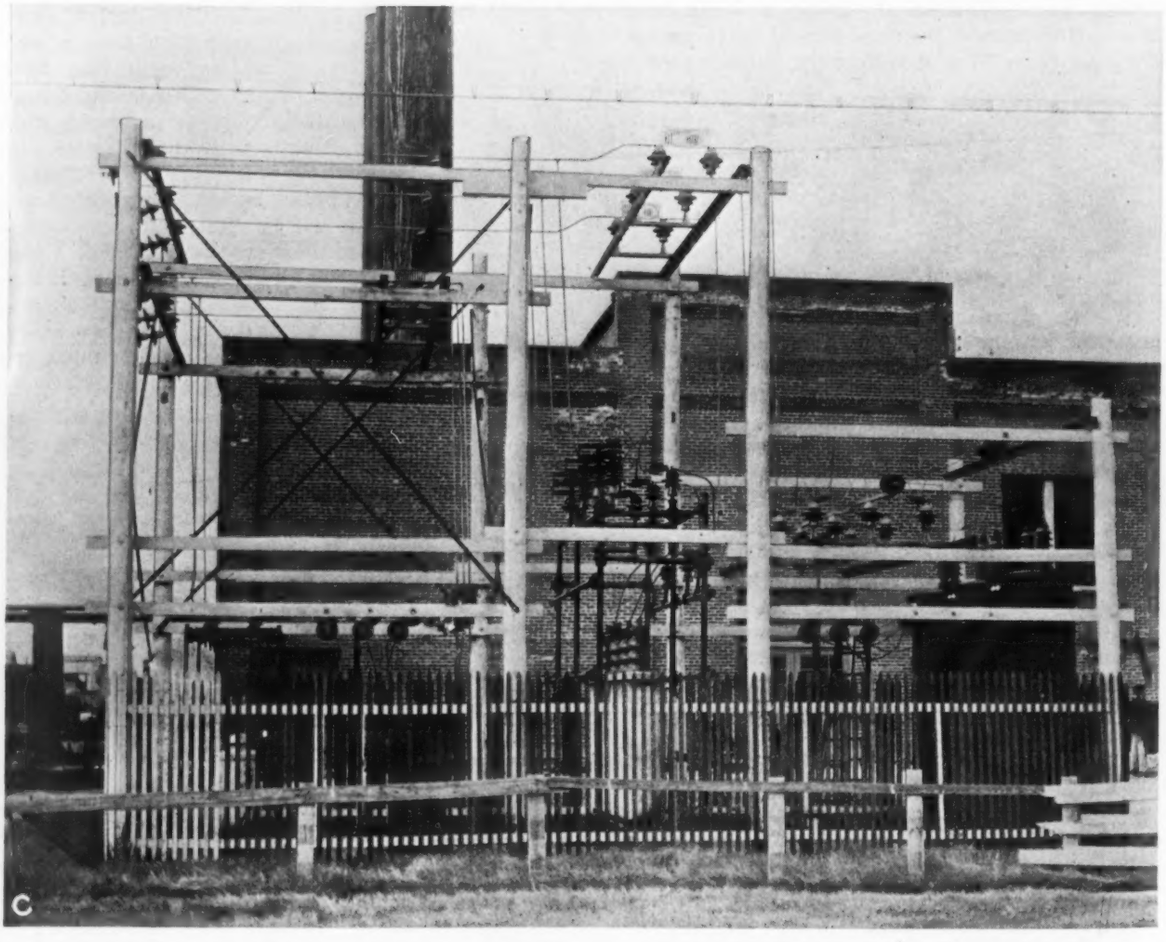
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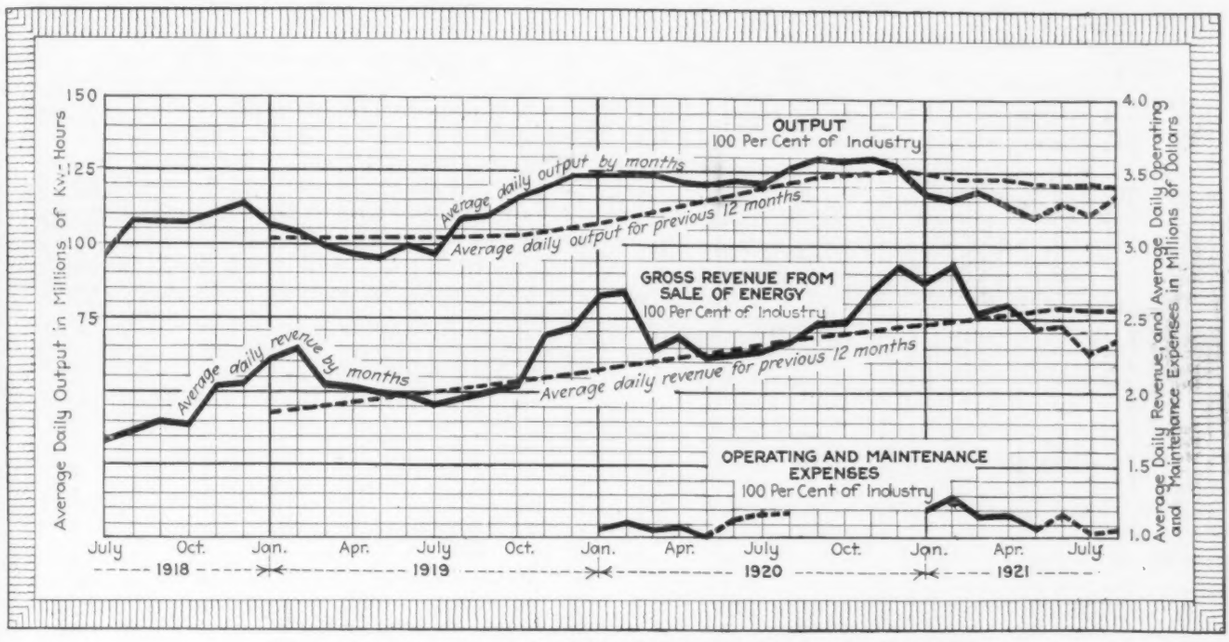
August Output Reflects Slight Increase in Industrial Activity


OUTPUT
100 Per Cent of Industry
Average daily output by months
Average daily output for previous 12 months
GROSS REVENUE FROM SALE OF ENERGY
100 Per Cent of Industry
Average daily revenue by months
Average daily revenue for previous 12 months
OPERATING AND MAINTENANCE EXPENSES
100 Per Cent of Industry
Average Daily Output in Millions of Kw.-Hours
Average Daily Revenue, and Average Daily Operating and Maintenance Expenses in Millions of Dollars
150
125
100
75
4.0
3.5
3.0
2.5
2.0
1.5
1.0
July Oct. Jan. Apr. July Oct. Jan. Apr. July Oct. Jan. Apr. July
1918 1919 1920 1921

CENTRAL STATION OUTPUT AND GROSS REVENUE INCREASE DURING AUGUST

REPORTS received by the ELECTRICAL WORLD for the month of August from central generating and distributing companies representing 78 per cent of the total installed generator rating reflect a slight revival of activity in the industrial centers of the country. A comparison with the output reported in July indicates that for the country as a whole the electrical output increased by 4.1 per cent during August. A certain increase in output for August over July was to be expected by reason of the seasonal increase in the lighting load. A careful study of the figures from the ten largest industrial cities of the nation, however, indicates that the increase in output over that reported for July was several per cent greater than the 4.1 per cent increase reported by the country as a whole. Two of the intensely industrial cities reported an increase of over 10 per cent in output, and the consumption in several other cities of this class ranged between 6 and 7 per cent above July. American industry is now relying on electrical energy to such an extent that the least depression or increase in activity in any primary industry in any section of the country is at once reflected in the operations of the central generating plant furnishing electrical energy to that section.

From an economic viewpoint the August returns are most encouraging to the electric light and power industry, especially when the industry is compared with other primary industries of the country. The electric light and power industry, while selling 6.4 per cent less electrical energy in August this year than in August of 1920, reported gross revenue from sale of energy 3.7 per cent in excess of that received in August of last year. In addition, the operating and maintenance expenses during August were 8.5 per cent below those of August of 1920.

Expressing these figures in terms of the operating ration, or ratio between operating expenses and gross revenue from sale of energy, gives further evidence of the tendency toward financial prosperity in the electric

TABLE I—CENTRAL-STATION RETURNS FOR TWELVE MONTHS

	Percentage of Installed Ratings Represented	Kw.-Hr. Output (Companies Reporting) 1920 Thousands	1919 Thousands	Per Cent Increase	Percentage of Installed Ratings Represented	Revenue from the Sale of Energy (Companies Reporting) 1920 Thousands	1919 Thousands	Per Cent Increase
Sept.	71	2,734,179	2,327,460	17.4	66	49,224	38,209	28.5
Oct.	71	2,797,625	2,499,488	11.9	66	51,370	41,055	25.1
Nov.	71	2,741,705	2,503,402	9.6	66	54,620	44,711	22.0
Dec.	71	2,792,554	2,648,746	5.4	66	57,697	48,580	18.6
		1921	1920			1921	1920	
Jan.	76	2,765,632	2,943,349	-6.0	70	58,855	50,861	15.8
Feb.	76	2,453,671	2,711,800	-9.4	70	55,540	48,633	14.3
Mar.	77	2,806,609	2,989,581	-6.1	72	55,513	49,071	13.3
April	78	2,675,949	2,895,067	-7.0	72	55,326	49,064	12.8
May	78	2,668,457	2,889,174	-7.6	72	53,901	47,932	12.6
June	78*	2,686,479	2,872,900	-6.4	72	52,385	47,977	9.3
July	78†	2,703,411	2,936,362	-7.9	72	51,118	49,111	4.1
Aug.	78‡	2,812,646	3,003,451	-6.4	72	52,383	50,519	3.7

	Percentage of Installed Ratings Represented	Operating and Maintenance Expenses (Companies reporting) 1921 Thousands of Dollars	1920 Thousands of Dollars	Per Cent Increase	OPERATING RATIO Steam Plants 1921	Steam Plants 1920	Hydro Plants 1921	Hydro Plants 1920	Combined Systems of Steam and Hydro 1921	Combined Systems of Steam and Hydro 1920
Jan.	40	14,562	13,085	11.3	56.1	55.3	26.8	27.0	38.1	45.6
Feb.	43	15,085	13,640	10.5	55.6	54.5	22.9	26.0	44.1	47.3
Mar.	53	18,757	17,248	8.7	56.1	57.7	23.4	19.6	40.2	44.8
April	53	17,815	16,641	7.1	53.0	56.5	23.9	19.8	41.4	43.3
May	53	17,274	16,727	3.1	55.4	56.8	24.2	22.9	40.6	44.8
June	54	18,836	19,089	-1.3	56.2	62.5	20.4	21.6	45.0	50.9
July	54	18,111	20,396	-11.2	56.8	65.9	20.6	20.2	43.0	52.6
Aug.	55	18,607	20,344	-8.5	56.2	63.8	22.3	22.2	44.5	52.3

*Includes estimates for 50 companies, representing 11.9 per cent of the total installed rating of all central stations.

†Includes estimates for 47 companies, representing 10.4 per cent of the total installed rating of all central stations.

‡Includes estimates for 71 companies, representing 18.8 per cent of the total installed rating of all central stations.

TABLE II—CENTRAL-STATION RETURNS BY SECTIONS OVER A TWELVE-MONTH PERIOD

	Month	New England States				Atlantic States				North Central States				South Central States				Pacific and Mountain States			
		Percentage of Installed Ratings Represented	1920 Thousands	1919 Thousands	Per Cent Increase	Percentage of Installed Ratings Represented	1920 Thousands	1919 Thousands	Per Cent Increase	Percentage of Installed Ratings Represented	1920 Thousands	1919 Thousands	Per Cent Increase	Percentage of Installed Ratings Represented	1920 Thousands	1919 Thousands	Per Cent Increase	Percentage of Installed Ratings Represented	1920 Thousands	1919 Thousands	Per Cent Increase
KW.-HR. OUTPUT	Sept.	82	194,730	170,593	14.1	66	905,872	758,737	19.5	74	878,237	758,017	15.9	56	147,524	113,649	30.0	79	607,816	526,464	15.5
	Oct.	82	196,310	191,132	2.7	66	964,739	841,694	14.5	74	896,241	817,757	9.5	56	157,267	126,769	24.1	79	583,068	522,136	11.7
	Nov.	82	193,231	183,624	5.4	66	953,436	825,011	15.5	74	895,229	861,352	10.5	56	144,889	125,438	15.0	79	554,920	507,977	9.2
	Dec.	82	210,494	227,403	-7.4	66	969,909	917,945	5.7	74	903,628	852,264	5.9	56	140,485	133,419	5.3	79	568,038	517,715	9.6
			1921	1920			1921	1920			1921	1920			1921	1920			1921	1920	
	Jan.	81	200,269	247,800	-19.2	77	1,003,223	1,043,650	-3.9	73	860,643	956,078	-10.0	62	144,936	145,336	-0.3	81	556,561	550,685	1.1
	Feb.	81	178,694	216,890	-17.6	77	902,030	970,539	-7.0	73	789,539	882,873	-10.6	63	131,654	132,537	-0.7	81	451,754	508,961	-11.2
	Mar.	81	205,348	230,309	-10.8	79	1,029,120	1,119,428	-8.1	73	894,500	941,893	-5.0	63	139,381	136,017	2.4	81	538,260	561,934	-4.2
	April	81	196,680	227,008	-13.3	79	963,659	1,052,716	-8.4	73	828,457	894,028	-7.3	63	132,075	135,421	-2.5	88	555,048	586,894	-5.4
	May	82	191,141	219,298	-12.8	79	934,973	989,408	-5.5	73	819,506	899,657	-8.9	63	136,573	138,416	-1.3	89	586,264	642,495	-8.7
	June	82	192,007	219,476	-12.5	79	940,443	1,003,727	-6.3	73	806,270	880,934	-8.5	63	136,011	129,120	5.3	89	611,128	639,637	-4.5
	July	81	187,567	219,144	-14.4	79	934,435	1,014,081	-7.9	73	802,438	883,903	-9.3	64	140,203	141,509	-9.2	89	639,768	678,725	-5.9
	Aug.	81	205,351	224,324	-8.5	79	981,745	1,036,035	-5.2	73	837,692	910,306	-7.9	64	146,475	156,784	-6.6	89	641,383	676,002	-5.1
REVENUE			1920	1919			1920	1919			1920	1919			1920	1919			1920	1919	
	Sept.	82	$5,409	$4,296	25.9	65	$18,081	$14,456	24.5	57	$13,834	$10,522	31.5	54	$3,262	$2,386	36.5	79	$8,638	$6,549	32.0
	Oct.	82	5,675	4,623	22.7	65	19,201	15,722	22.0	57	14,458	11,667	23.9	54	3,504	2,551	37.3	79	8,532	6,492	31.5
	Nov.	82	5,898	5,017	17.5	65	20,938	17,119	22.2	57	15,158	12,561	20.8	54	3,853	2,910	32.4	79	8,775	7,104	23.5
	Dec.	82	6,548	5,744	14.0	65	22,332	19,149	16.7	57	16,004	13,142	21.8	54	3,722	3,113	19.8	79	9,091	7,432	22.3
			1921	1920			1921	1920			1921	1920			1921	1920			1921	1920	
	Jan.	81	6,379	6,170	3.5	74	22,180	19,225	15.3	59	16,818	14,436	17.3	62	4,155	3,484	19.3	81	9,323	7,546	23.6
	Feb.	81	5,925	5,728	3.4	74	21,492	18,327	17.4	59	15,971	14,070	13.6	62	3,915	3,329	17.6	81	8,237	7,179	14.7
	Mar.	81	5,784	5,566	3.8	76	21,822	18,934	15.3	59	15,853	14,103	12.4	63	3,747	3,246	15.5	81	8,307	7,222	15.0
	April	81	5,665	5,554	2.0	76	21,504	18,509	15.8	60	15,506	13,822	12.2	63	3,744	3,312	13.2	88	8,817	7,767	13.6
	May	82	5,362	5,342	0.4	76	20,795	17,613	18.0	60	14,866	13,558	9.8	63	3,516	3,179	10.7	89	9,362	8,240	13.7
	June	82	5,285	5,397	-2.4	76	20,058	17,438	15.0	60	14,485	13,519	7.1	63	3,536	3,152	12.2	89	9,021	8,439	6.9
	July	81	5,186	5,114	1.4	76	19,088	17,082	11.7	60	14,226	14,679	-3.1	63	3,516	3,151	11.6	89	9,101	8,733	4.2
	Aug.	81	5,297	5,483	-3.4	76	19,550	17,765	10.0	60	14,479	14,500	-0.1	63	3,594	3,523	2.1	89	9,463	9,248	2.3
OPERATING EXPENSES:			1921	1920			1921	1920			1921	1920			1921	1920			1921	1920	
	Jan.	34	$1,098	$1,288	-14.7	48	$6,373	$5,411	17.8	28	$3,941	$3,451	14.2	37	$1,015	$905	12.2	54	$2,135	$2,030	5.2
	Feb.	35	1,069	1,242	-13.9	53	6,799	5,937	14.5	29	3,958	3,445	14.8	44	1,217	1,053	15.5	55	2,042	1,963	3.9
	Mar.	45	1,576	1,651	-4.5	59	7,969	7,241	10.0	35	4,570	4,228	8.2	51	1,776	1,514	17.2	79	2,866	2,614	9.7
	April	45	1,418	1,479	-4.1	59	7,590	7,168	5.9	36	4,347	4,112	5.7	51	1,567	1,403	11.6	79	2,893	2,479	16.8
	May	48	1,548	1,577	-1.8	56	6,921	6,660	4.0	37	4,274	4,292	-0.4	52	1,563	1,486	5.2	81	2,969	2,713	9.5
	June	46	1,737	1,862	-6.7	56	6,916	6,878	-0.5	39	4,843	5,152	-5.9	60	1,835	1,678	9.4	83	3,565	3,519	1.3
	July	47	1,715	2,072	-17.2	53	6,259	6,600	-5.2	39	4,913	5,759	-14.7	62	1,885	2,028	-7.1	83	3,339	3,937	-15.2
	Aug.	48	1,861	2,088	-10.9	53	6,334	6,573	-3.6	39	4,949	5,621	-12.0	62	1,862	1,998	-6.8	88	3,600	4,063	-11.4

light and power industry. During August of the present year the operating ratio of companies having steam electric generating plants only, taken in the aggregate, was 56.2 per cent, as against 63.8 per cent reported for August, 1920. Companies having combined systems of both steam and hydro plants reported an operating ratio of 44.5 per cent for August of this year and 52.3 per cent for August of 1920.

Reports of industrial conditions during August indicate that eight of the fourteen industrial groups of the country showed increased activity during August. These eight industrial groups include the principal consumers of industrial electrical energy, and the fact that these were the first to show a revival in operations argues well for the industrial load of the central generating and distributing companies during the fall and winter.

Slightly increased activity by the metal and metal

TABLE III—AGGREGATE OPERATING RATIO OF COMPANIES REPORTING DATA MONTHLY TO THE "ELECTRICAL WORLD"

Type of Generating Plant and Month	New England States				Atlantic States				North Central States				South Central States				Mountain and Pacific States			
			Average for Year				Average for Year				Average for Year				Average for Year				Average for Year	
	1921	1920	1921	1920	1921	1920	1921	1920	1921	1920	1921	1920	1921	1920	1921	1920	1921	1920	1921	1920
Steam Plants:																				
January	54.0	60.8	54.0	60.8	53.5	50.9	53.5	50.9	61.2	61.8	61.2	61.8	53.1	53.7	53.1	53.7	69.0	60.5	69.0	60.5
February	54.3	59.5	54.2	60.3	52.3	53.0	52.7	52.1	63.0	57.9	62.1	59.8	59.1	51.2	56.2	52.3	60.2	60.3	64.3	60.3
March	64.0	70.0	56.7	62.5	54.5	56.7	53.3	53.7	58.4	59.7	60.8	59.8	53.3	50.9	55.0	51.9	68.4	62.5	65.9	61.2
April	59.4	63.5	57.3	62.7	50.9	54.3	52.8	53.8	54.8	61.2	59.3	60.2	54.1	52.8	54.7	52.1	53.7	53.7	61.8	58.6
May	63.2	69.1	58.3	63.8	56.2	58.6	53.4	54.5	54.7	63.3	58.5	60.8	53.3	56.0	54.4	53.0	55.0	57.0	59.9	58.3
June	60.1	71.2	58.7	64.9	55.8	59.5	53.8	55.3	56.6	68.3	58.3	61.8	55.3	60.0	54.6	53.8	53.4	56.2	58.6	57.8
July	60.7	77.3	59.0	66.7	57.2	62.7	54.1	56.1	56.9	70.6	58.1	63.0	55.1	62.4	54.7	55.3	53.3	59.3	57.8	58.0
August	67.3	72.3	60.1	67.3	55.8	61.3	54.2	56.6	56.0	70.0	57.8	63.9	53.3	57.3	54.3	55.7	51.8	59.8	57.0	58.5
Hydro Plants:																				
January	26.5	35.2	26.5	35.2	21.2	21.2	21.2	21.2	25.0	20.8	25.0	20.8	26.4	20.1	26.4	20.1	27.5	27.3	27.5	27.3
February	30.1	46.5	26.8	35.6	20.1	20.6	20.7	20.9	24.1	20.6	24.6	20.6	28.6	21.4	27.4	20.5	23.9	27.9	26.0	27.6
March	29.9	30.0	26.9	35.3	21.0	20.6	20.8	20.8	23.0	20.6	23.5	20.6	30.4	23.2	28.4	21.3	24.9	19.0	25.8	25.6
April	24.6	34.7	26.5	35.2	18.2	18.8	20.2	20.3	24.8	20.8	24.2	20.7	22.4	25.0	26.8	21.2	27.3	19.2	26.0	24.2
May	26.5	25.6	26.5	34.3	15.5	17.4	19.2	19.7	21.5	20.1	22.5	20.5	27.9	21.2	27.1	21.2	29.8	22.9	26.6	24.0
June	29.2	21.5	26.6	33.8	17.6	18.8	19.0	19.6	21.1	19.5	22.8	20.2	27.3	18.3	27.1	20.7	30.3	27.4	27.6	24.2
July	29.2	29.6	26.6	33.9	15.9	21.1	18.6	19.8	19.4	19.7	22.3	20.2	27.3	18.3	27.7	20.7	24.2	19.9	26.3	23.7
August	31.4	36.5	26.8	33.9	16.7	20.9	18.3	19.8	20.7	21.6	22.0	20.4	33.7	23.1	28.5	21.0	25.1	24.3	26.2	23.6
Combined Systems of Steam and Hydro Plants:																				
January	45.3	53.5	45.3	53.5	43.5	45.8	43.5	45.8	39.5	38.6	39.5	38.6	38.6	46.6	38.6	46.6	35.2	45.6	35.2	45.5
February	44.3	60.0	44.7	58.8	41.8	41.9	42.6	43.8	42.4	49.8	41.9	48.2	41.7	39.6	40.5	42.0	39.6	43.8	37.4	44.7
March	49.7	53.8	47.3	56.0	39.7	47.3	42.0	45.3	41.5	46.0	41.8	47.3	38.6	39.2	40.2	41.2	36.4	39.7	36.9	43.0
April	46.6	48.5	47.1	53.5	42.9	43.9	41.9	44.8	45.0	48.3	42.7	47.5	43.6	48.6	40.7	42.8	37.0	36.8	37.0	41.0
May	49.2	48.5	47.6	52.3	39.8	44.2	41.4	44.7	47.0	52.8	43.7	48.8	40.7	39.6	40.6	42.2	35.0	38.3	36.4	40.3
June	58.5	56.5	49.6	53.2	42.3	45.8	41.6	44.9	50.1	62.2	45.0	51.6	45.1	44.8	41.3	42.7	38.8	44.3	37.0	41.1
July	56.1	63.2	50.5	54.7	42.6	51.3	41.7	45.8	51.6	64.4	46.0	53.9	53.6	45.3	41.4	42.8	35.4	43.1	36.8	41.5
August	60.6	62.7	51.9	55.8	46.5	49.0	42.3	46.2	51.2	64.5	46.6	55.5	45.3	50.0	41.9	43.8	36.8	43.5	36.7	41.8

products industry and also in the leather industry of New England, in addition to an increased lighting load, probably accounts for the increase of 9.5 per cent in the output of the electric light and power companies of this section above the July operations. A further indication of the increased industrial load in New England is the fact that while the energy consumption during July of this year was 14.4 per cent below that of July, 1920, in August the output had decreased to 8.5 per cent under that of August of last year.

The iron and steel mills continue to operate at greatly reduced activity, though increased activity in some centers was reported. Other industries in the Middle Atlantic States increasing their consumption of electrical energy during August were the textile and leather industries. In the South Atlantic States the textile mills continue to call for more energy. The unprecedented water shortage in this section resulted in considerable decrease in the operation of hydro-electric plants during August, and several companies found it necessary to start up steam reserve plants. In one instance curtailment of electric power supply resulted. As a result of these conditions in the South Atlantic States, the operating ratio in the Atlantic Section as a whole of the companies having combined steam and hydro systems increased from the 42.6 per cent reported in July to 46.5 per cent in August. The total output of the electric light and power companies of the Atlantic States during August was about 5 per cent above that reported for July.

A slight improvement in iron and steel mill operations and near-capacity operation of flour mills and packing plants, aided by an increased lighting load, is reflected to a degree in the 4.5 per cent increase in the kilowatt-hour output of the North Central States.

In the South Central States the only increased industrial activity of any extent during August was reported by the lumber industry, other industries operating about on a level with July. The net results of these slightly increased industrial energy requirements, plus an increased lighting load, were an electrical output of about 4.5 per cent above that of July.

Manufacturing and mining operations in the Mountain States showed but slight improvement during August. Industrial activity in the Pacific States was on a par with that during July. The irrigation load was, however, considerably decreased during August, which probably offset any increased lighting load in that section. Taking the Mountain and Pacific States as a whole, the operations of the electric light and power companies of the section were virtually the same as during July.

Hydro-Electric Commission of Ontario Reports Steady Growth of Demand

THE thirteenth annual report of the Hydro-Electric Power Commission of Ontario, which covers the year ended Oct. 31, 1920, says that that year was the most successful in the history of the commission. A curve showing the gradual though persistent increase in electricity used by the districts supplied by the commission from October, 1910, to October, 1920, takes a form which indicates remarkably small divergencies above or below a straight line, even the falling off after the armistice being moderate and temporary. In September, 1920, the demand reached 200,000 hp.

Maintenance of Trolley-Type Mine Locomotive

Daily, Weekly and Semi-Annual Schedule of Inspections for Locating Trouble on Motor, Controller, Trolley, Brakes, Etc.

BY FREDERICK KRUG
Electrical Engineer New York & Honduras Rosario Mining Co., San Juancita, Honduras, C. A.

THE severe service to which electric mine locomotives are constantly subjected makes them liable to a great many more ills than arise with machinery that remains stationary. Considerable time and expense can be saved if the methods of locating troubles are standardized and followed in a systematic manner. If, in addition, the locomotives and the trolley wiring and bonding as well receive thorough and regular inspection, the interruptions to service and the maintenance cost will be reduced to a minimum. A locomotive that is handled properly and on which repairs are made before serious troubles develop will cost considerably less for maintenance than if inspections are not made at regular intervals. A schedule which is followed in one mine is given herewith.

The three principal troubles which locomotives are apt to develop in service are open circuits, grounds and short circuits. These manifest themselves in distinct ways, and a little experience will soon enable one to ascertain the trouble very quickly. As a general guide in locating trouble the accompanying table will prove of value.

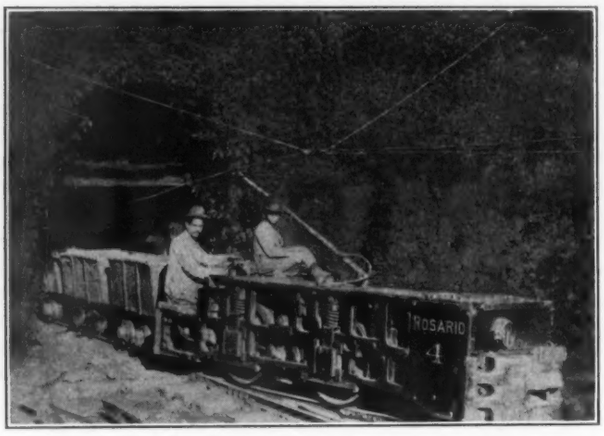
If the trouble is not immediately apparent, it is well to make the following tests in regular order, making use of a magneto or lamps in series with two test leads. If the trouble is surmised to be an open circuit, first make certain that the motor brushes make good contact on the commutator; also remove the trolley from the wire and globes from the head lamps. Test between the trolley wheel and the terminal marked "T," or "trolley," in the controller. If a circuit is found, test between the first and last fingers of the resistance leads. If no circuit is obtained here, disconnect the resistance leads from the terminals one by one and thus isolate the trouble, which will be found to be either in the wiring or in the resistance. If a circuit is obtained, the open circuit is probably in one of the motors and can be located by testing the motor leads.

If it is apparent that the trouble is a ground, proceed in a similar manner, testing from the trolley wheel to the motors, first, however, disconnecting all permanent grounds and notching up the motor brushes. Isolate the ground by disconnecting the circuit, section by section. Attach one lead of the magneto or lamps to ground and test each part in turn with the other.

In connection with the scheduled inspections it is well to remember the following: To insure the proper connection of motors when reinstalled after overhauling, wire a fiber tag to each motor lead and the corresponding tag to the lead connected with it. Mark these according to the wiring blueprint for the locomotive. Adjust parts as follows with the spring scales: Pressure of controller fingers, 2½ lb.; pressure of trolley pole or wire at the average height, about 12 lb. to 15 lb.; pressure of motor brushes, between 3 lb. and 4 lb.

In the average mine sufficient attention is rarely given to the trolley circuit, connections and bonding.

The effect of insufficient feeder capacity, poor connections and poor bonding is to cause an excessive loss in voltage, the stalling of locomotives with load and the burning out of armatures because of this low voltage and the excessive current drawn from the line. So, in a sense, attention to these matters is really a part of proper locomotive maintenance. The feeder connections to the trolley wire should be inspected occasionally as the repeated passage of the locomotive will in time often cause the connections to work loose. In a similar manner connections at sectionalizing switches will need attention now and then. The practice of hooking the feeder wire around the trolley clamps should never be permitted, as it invariably works loose and causes trouble because of the high resistance introduced. Putting wire jumpers around section insulators instead of using switches with insulated handles is also a very poor practice.



SYSTEMATIC MAINTENANCE KEEPS THIS EQUIPMENT IN CONDITION

If the bonding of the rails for the return circuit was properly done at the time of installation, very little trouble should be experienced from this source. Wherever possible, however, it is advisable to give the rail joints periodic tests in order to maintain them at their highest efficiency. The fishplate bolts should be kept tight so as to eliminate as much vibration of the rails as possible. Cross bonding every 250 ft. or so will help maintain the continuity of the circuit in event of the breakage of the bonds on one section of rail. It is also good practice to bond to water pipes or air lines where they parallel the track and then run a lead from these pipes to the power house. If the voltage at the locomotive at maximum load is much less than 80 per cent of the voltage at the power house, it is generally advisable to install additional feeders, first making sure that the loss is not due to excessive resistance in the return circuit. The best practice calls for an equal loss of voltage in the feeder wire and in the track circuit.

Some attention should also be given to the mine cars hauled by the locomotive. They should be kept in proper operating condition and well lubricated.

TROUBLES TO LOOK FOR ON MINE LOCOMOTIVES

	Trouble	Cause
1.	Failure to operate on any position of controller.	Open circuit, usually in wiring. Ground connection disconnected or burnt off.
2.	Locomotive operates on some notch after first.	Open circuit in resistance grids between notch it starts on and last previous notch.
3.	Locomotive operates with motors in parallel, but not in series.	Open circuit in one motor, either in connection or the field.
4.	Circuit breaker opens on some notch of the controller, usually the first.	Ground on resistance or on one of the motors.
5.	Locomotive operates in series, but circuit breaker opens with controller in parallel.	Ground on one of the motors.
6.	Jerky rotation of armature and bad sparking.	Open circuit in armature.
7.	Local heating of armature and sparking and pitting of one spot of commutator.	Short circuit in armature.
8.	Heating and higher speed of armature and perhaps flashing.	Short circuit in field.

LOCOMOTIVE INSPECTION AND MAINTENANCE SCHEDULE

DAILY

TROLLEY POLE

See that the trolley-pole runs freely and that harp, wheel axle, springs, brushings and trolley pole cable are in good condition for the day's run. If any part is found defective, change for spare trolley pole and leave in shop for repairs. Put a few drops of oil on the swivel base and trolley-wheel axle.

CONTROLLER

Examine carefully for any loose parts. Smooth down any slightly burned fingers or contact segments and change any that are badly burned, making sure that they make good contact by turning controller off and on several times. Clean controller thoroughly and then put a very light coat of vaseline on the segments and fingers and a few drops of oil on the shaft bearings and pawls.

MOTORS

Note condition of commutator and see that brushes work freely and make good contact.

BRAKES AND DRIVING BOXES

See that the entire braking equipment is in satisfactory condition for the day's run, making sure to note whether brake shoes are wearing evenly. If not, adjust. See that the wool waste in the driving boxes is touching the axle and is well saturated with oil. Make sure that covers fit tightly to prevent the entrance of foreign matter.

WEEKLY

GENERAL

Clean locomotives thoroughly and blow out with compressed air. Repeat the regular daily inspection and make any changes for which time could not be found during the week. In addition, examine the following:

CIRCUIT BREAKER

Clean contacts and put a few drops of oil on all working parts.

WIRING

See that all connections are tight and that the cable is in good condition. Replace marker tags before they become unrecognizable, so as to keep the machine in readiness for disconnection and reconnection of the wiring at short notice. See that all joints are well taped and give the cable an occasional coat of black insulating varnish.

RESISTANCE GRIDS

After thoroughly cleaning and blowing out, examine for any tendency to buckle and replace any that are likely to cause short circuits. Make sure all parts are tight.

BRASSES

Examine journal brasses in the driving boxes and replace those worn too thin. Repack any boxes in which the waste has become dirty.

BEARINGS

Note the condition of the armature and axle bearings and see that the housing contains sufficient oil to keep the wool waste well saturated. Every two weeks put a small amount of grease on the ball bearings of the motors that are thus equipped.

GEARS AND PINIONS

Examine carefully to see that pinions are tight and not badly worn. See that the gear case fits snugly and prevents the entrance of foreign matter. Grease the gear wheel.

BRAKE SHOE

Replace brake shoes when worn too thin.

MOTORS

Remove tap from bottom of motor frame to draw off any oil that may have collected. Remove top cover and clean brush holders and windings with a cloth. Blow out thoroughly and replace. If commutator is rough and blackened, clean with No. 00 sandpaper on the end of a block of wood. To do this remove the brushes of the motor to be cleaned and run locomotive with the controller in "parallel" by the other motor.

SEMI-ANNUAL

Remove motors from locomotive and disassemble. Clean thoroughly and give the field coils and armature a coat of black air-drying varnish if necessary. See that all connections and wiring are in good condition. Replace any worn parts of brake rigging. Change armature and axle bearings if found worn. Change wheels and axles if necessary and put washers on axles if there is play between wheels and frames. Thoroughly overhaul controllers and put locomotives in first-class operating condition.

Letters from Our Readers

This is a readers' forum. Comments on questions before the electrical industry presenting economic, financial, engineering or commercial aspects and new or supplementary viewpoints on published articles are cordially invited

Kva. Demand Found by Two Synchronized Demand Meters

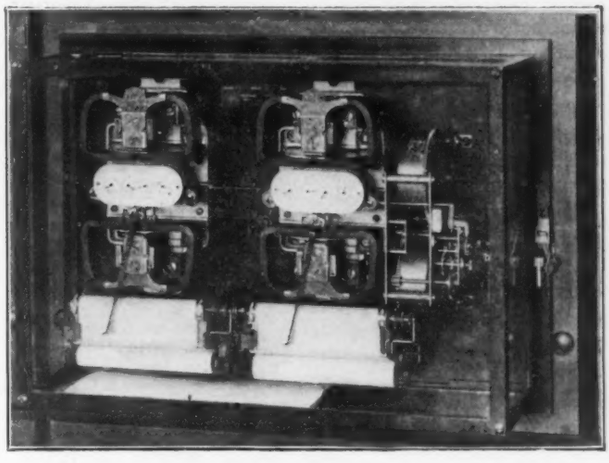
To the Editors of the ELECTRICAL WORLD:

The fact that the cost of virtually all alternating-current equipment is based upon its kilovolt-ampere capacity, while the energy produced or used by the same equipment is sold on the basis of the kilowatt, was brought out in an article by H. W. Meyer in the Sept. 17 issue of the ELECTRICAL WORLD, page 576. This situation has been long understood and studied, and many attempts have been made to correct the unfair condition by basing charges upon the kilowatts of demand corrected for power factor. This method, too, has been recognized as only a partial solution, since there has been no way that the actual kilovolt-ampere demand could be satisfactorily measured.

To meet the required conditions the Alabama Power Company has developed a meter which is used successfully for determining kilovolt-amperes of demand. This meter is really a combination of two watt-hour-demand meters in one case, controlled by one clock, which insures synchronous operation of both charts. These meters are standard meters which are used extensively to measure integrated kilowatt demands. One meter is so connected to the instrument transformers as to record kilowatts and the other so connected as to record the reactive kilovolt-amperes. Thus the two components which together compose the kilovolt-amperes are measured and recorded. The period over which the integration is made is the same as has been used for the kilowatt demand—fifteen minutes.

With this duplex meter there are, then, recorded the fifteen-minute demands in kilowatts and in reactive kilovolt-amperes. It is, therefore, possible to determine, by a formula readily understood, the fifteen-minute kilovolt-ampere demands without the aid of other instruments and with a high degree of accuracy. It is also possible for a customer to see at all times just how his demand is varying and whether it is possible for him to improve his power factor and hence decrease his demand. These two curves are drawn on different charts, but are constantly in view side by side on the meter and must keep in synchronism, so that they give what now appears to be the best means available for measuring a customer's kilovolt-ampere demand for billing purposes. They have the further advantage that the cost of the duplex meter is less than one-half the cost of a graphic kilovolt-ampere meter and a graphic wattmeter. Each unit of this duplex meter is equipped with a dial which records kilowatt-hours and reactive kilovolt-ampere-hours respectively, so that all the information required for billing the customer and for helping him to improve his power factor and reduce his demand is obtained from this metering set. The illustration shows the meter as installed on the switchboard of a large power customer operating from the Alabama Power Company's circuits.

It is thought that this meter overcomes many objections which can be raised to other means of measuring demand. Mr. Meyer's suggestion that it is possible to measure this demand by the use of a graphic recording voltmeter and ammeter is unusual. It is unfortunately open to the objection that the currents and the voltages of a three-phase system are seldom, if ever, balanced in commercial circuits, and hence this method is almost certain to be in error. In addition, it is difficult to use the charts from these meters, as virtually all demand charges are today based upon definite time intervals, that is, are demands integrated over some period—as thirty minutes, fifteen, five or even one minute. Hence, to measure such a demand from these curves with any reasonable accuracy, various sections of both ammeter and voltmeter curves must be measured with a planimeter, which is, to say the least, a cumbersome method.



KVA. DEMAND DETERMINED BY THESE TWO DEMAND METERS, WHICH ARE BOTH OPERATED BY ONE CLOCK

Fortunately, a new meter has recently been placed upon the market which measures the kilovolt-amperes directly, although Mr. Meyer says no such instrument is available This is a graphic recording meter which gives a curve similar to other graphic instruments made by various manufacturers.

To use this meter for billing purposes for an integrated demand over a definite period it is still necessary to planimeter the curve or otherwise average it. This is cumbersome and has the further objection that no indication is given of the actual conditions in the customers' circuits. That is, the measurement of the kilovolt-amperes *per se* in no way indicates to the customer whether his power factor is good or bad. Therefore he cannot tell whether he ought to be able to reduce his demand or not. Central-station companies that are selling on a kilowatt-demand basis have already found that argument arises with customers whose demand meters show higher than they think is correct. The chances for discussion over a kilovolt-ampere demand are much greater unless some means is provided to prove conclusively to a customer that his power factor has also varied. To do this it really is necessary to have a second graphic meter which registers kilowatts.

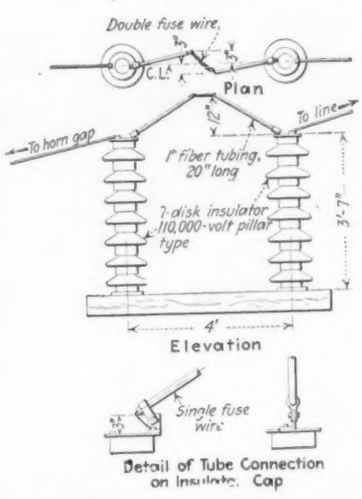
Alabama Power Company, S. A. FLETCHER,
Birmingham, Ala. Superintendent of Service.

Industrial and Station Practice

Installation, Operation and Maintenance of
Generating and Distribution Equipment and Economical Utilization of Electrical Energy
in Mills and Factories, Including Testing and Repair Methods

Expulsion Fuse for 110,000-Volt Tests

A SATISFACTORY fuse was desired in making some recent tests on lightning arresters connected to a three-phase, 110,000-volt transmission line of the Georgia Railway & Power Company. The expulsion-type fuse shown in the accompanying drawing was developed for the purpose and was found to be very satisfactory. The fuse was made of two pieces of 1-in. fiber tubing 20-in. long and shellacked inside and outside to prevent weathering. The tubes were supported on pillar-type insulators 48 in. apart. The free ends of the tubes were placed 3 in. on each side of the center line of the insulators and 12 in. above the top of the insulator caps, as shown in the diagram, so that the fuse could not blow straight across or to ground. The fuse wire was doubled across the open space between the tubes to force the arc formation to some point inside the tubes, which would allow the doubled section to drop clear of the arc path, thereby avoiding a heavy arc between the tubes.



FUSE USED IN TESTING LIGHTNING ARRESTERS ON 110-KV. LINE

The test was made by clearing the line of all load and connecting it to a separate 12,000-kw. unit at Tallulah Falls, the test being made in Atlanta, 89 miles away. This placed about 74,000 volts across the fuse from line to ground with very little resistance in series.

During the test two fuses were blown. When the first one blew no ground was indicated on the instruments at Tallulah, but when the second fuse blew a ground showed up, caused by a dead short circuit to the ground. In both cases the fuse blew inside of each tube and the double portion fell to the ground without a heavy arc and showed no signs of fusing. The current was stopped so quickly that the circuit breaker at Tallulah Falls did not trip out.

Georgia Railway & Power Co., C. H. ARMSTRONG,
Atlanta, Ga. Engineer.

Production Costs of Detroit Company at Connors Creek Station

PRODUCTION costs per kilowatt-hour of output for the Connors Creek station of the Detroit Edison Company are shown in the accompanying table. These costs are compiled on the basis of the twelve-month periods ended June and December of the years 1916 to 1921 inclusive. It must be remembered that the station has been greatly increased in size since 1916 and that new equipment has been installed. About the most significant feature of the table is the fact that better efficiencies are being obtained during the last twelve months as a result of getting the plant back into condition, particularly the completion of repairs to the two turbines which had to be taken out of service in July, 1920, and the systematic overhauling of all equipment, which was impossible during the war years and the boom years which followed. While the efficiency for the year 1920 was 1.92 lb. of coal (or 23,300 B.t.u.) per kilowatt-hour, the efficiency of the first seven months of 1921 was 1.65 lb. of coal (or 20,600 B.t.u.) per kilowatt-hour.

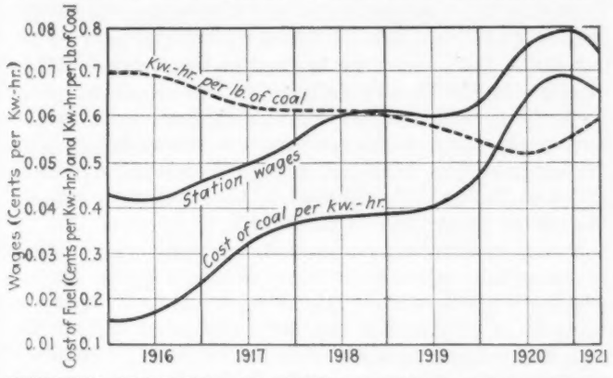
Regarding the operating results for the twelve-month period ended June 30, 1921, Alex Dow, president and

PRODUCTION EXPENSES AT CONNORS CREEK POWER HOUSE (CENTS PER KILOWATT-HOUR OUTPUT)

	For Twelve-Month Periods Ended										
	June 30, 1916	Dec. 31, 1916	June 30, 1917	Dec. 31, 1917	June 30, 1918	Dec. 31, 1918	June 30, 1919	Dec. 31, 1919	June 30, 1920	Dec. 31, 1920	June 30, 1921
Operation:											
Superintendence	0.013	0.013	0.010	0.010	0.009	0.009	0.010	0.010	0.010	0.012	0.015
Wages	0.043	0.042	0.047	0.050	0.055	0.061	0.062	0.060	0.062	0.076	0.079
Fuel	0.158	0.174	0.240	0.325	0.368	0.382	0.394	0.407	0.471	0.652	0.682
Water	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lubricants	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.002	0.001	0.002	0.002
Station supplies and expense	0.005	0.006	0.005	0.005	0.006	0.009	0.010	0.007	0.011	0.012	0.010
Maintenance:											
Station buildings	0.006	0.007	0.011	0.010	0.008	0.007	0.008	0.011	0.010	0.011	0.012
Steam equipment	0.019	0.016	0.019	0.024	0.025	0.023	0.024	0.029	0.036	0.038	0.043
Electrical equipment	0.003	0.003	0.001	0.001	0.002	0.001	0.001	0.001	0.001	0.003	0.003
Total	0.248	0.262	0.334	0.426	0.474	0.493	0.511	0.527	0.602	0.806	0.846
Kw.-hr. output	125,158,800	162,117,600	210,039,700	249,192,200	280,814,700	327,020,500	383,252,000	445,535,500	488,060,600	479,425,900	485,189,500
Maximum demand (thirty minutes), kw	35,000	36,000	50,000	58,000	59,000	80,000	82,000	104,000	104,000	100,000	107,500
Average load, kw	14,300	18,500	23,900	28,400	32,100	37,300	43,700	50,800	55,600	54,600	55,300
Load factor	0.409	0.514	0.478	0.489	0.544	0.466	0.533	0.488	0.534	0.546	0.515
Coal per kw.-hr., lb	1.44	1.45	1.52	1.61	1.63	1.63	1.67	1.73	1.83	1.92	1.78
B.t.u. per kw.-hr	19,700	19,800	20,040	20,470	20,930	20,900	21,200	21,800	22,800	23,300	21,800

general manager of the company, says: "I am glad to say that the improvement indicated continues, and that unless there is some unforeseen mischance, the B.t.u. figures for the calendar year will be somewhere near those of the earlier years of the plant before overloads, war-time fuel and crippled turbine came into the equation. The plant is still without economizers. The temporary 10,000-kw. turbine is still in place of one of the 20,000-kw. machines; one 20,000-kw. machine has been rebuilt, and the second one is in the shop, while the third is awaiting its turn."

It will be noted that for almost every item the costs in the year ended June, 1921, were considerably greater than for the preceding year. Coal was the chief item which was responsible for the 40 per cent increase in production costs comparing figures for the twelve-month



OPERATING CONDITIONS AT DETROIT COMPANY ARE IMPROVING

periods ended June, 1920 and 1921. The unit cost for coal was 45 per cent higher in the year ended June, 1921, than in the previous year and 300 per cent higher than in 1916. In the year ended June, 1921, coal alone cost nearly two and three-quarters times the entire cost of generation in 1916. As may be noticed from the curves, the coal cost per kilowatt-hour and also the labor cost have reached their peaks and are now on the downward slope. In the former case this is, of course, partly due to increased efficiency.

Feeder Voltage Regulators to Reduce Cost of Line Construction

THE choice between voltage regulators to compensate for the voltage drop in a feeder and an increase in the section of the line copper to decrease the drop depends on the relation between the cost of the regulator plus the cost of the losses in the regulator and in the line, on the one hand, and the cost of additional line copper (sufficient to decrease the line drop to an allowable amount) plus the line loss, on the other.

Assuming, as an arbitrary illustration, a 100-amp., 2,300-volt, single-phase lighting feeder one mile long, and comparing the use of a line of one No. 3/0 wire and one of No. 4 wire, and further assuming the difference in the cost of the line construction to correspond to the difference in the cost of the copper at $0.30 per pound (this cost including the increase in the line cost as a whole), then, on the basis of power cost of 1 cent per kilowatt-hour and with the load factor assumed, the comparison shown in table above applies.

The saving of $327 in investment does not justify the annual loss of $259.70, and therefore, a regulator is not desirable.

FEEDER COST WITH AND WITHOUT REGULATOR

Size of wire	One No. 3/0	One No. 4
IR drop, in per cent	2.84	11.4
Loss in line in kilowatt-hours per year:		
Two hours per day at full load	4,760	19,150
Two hours per day at three-quarters load	2,670	10,200
Two hours per day at half load	1,190	4,780
Two hours per day at quarter load	300	1,190
Total	8,920	35,320
Feeder regulator recommended, per cent		7.5
Kilowatt rating		17.25
Kilowatt-hours per year loss in regulator:		
Two hours per day at full load		570
Two hours per day at three-quarters load		325
Two hours per day at half load		280
Two hours per day at quarter load		205
Sixteen hours per day at no load loss		1,460
Total		2,840
Cost of line at $0.30 per pound	$1,630.00	$403.00
Cost of regulator	.....	900.00
Total cost	$1,630.00	1,303.00
Saving in investment	.....	327.00
Total losses, in kw.-hr	8,920	38,160
Cost, at 1 cent per kw.-hr	$89.20	$381.60
10 per cent on investment	163.00	130.30
Total cost per year	$252.20	$511.90
Excess operating cost of No. 4 line per year		$259.70

Now, assuming for the same load a line two miles long and having the same voltage drop, this will require doubling the section of the line without making any change in the regulator. The costs then will be:

	Two No. 3/0	Two No. 4
Cost of line, at $0.30	$6,520.00	$1,612.00
Cost of regulator	.....	900.00
Total cost	$6,520.00	$2,512.00
Saving in investment	.....	4,008.00
Total losses, in kw.-hr	8,920	38,160
Cost at 1 cent per kw.-hr	$89.20	$381.60
10 per cent on investment	652.0	251.20
Total cost per year	$741.20	$632.80
Excess operating cost of two No. 3/0 wires		108.40

By using a regulator the saving in the investment is very appreciable, being $4,008, and the total saving per year in favor of the "two No. 4" regulated line is $108.40. From this analysis it would seem that in this case the cost of line construction can be very appreciably decreased by using a regulator.

The use of regulators to reduce line construction cost is not, however, the only consideration, for by their use any variations in bus voltage can be compensated for and a uniform voltage maintained at the center of distribution of each feeder, thereby increasing the sale of power and giving more satisfactory service to customers. The use of various sizes of line copper so that each feeder will most economically satisfy the conditions of service may be objectionable from a standardization viewpoint, especially in congested districts where the feeders are short or where underground feeders are used. It would, however, seem that for overhead lines, and especially for suburban lines of some length, economy could be obtained by the use of smaller line copper, or copper-sheathed wire, and feeder regulators.

General Electric Company, E. F. GEHRKENS.
Pittsfield, Mass.

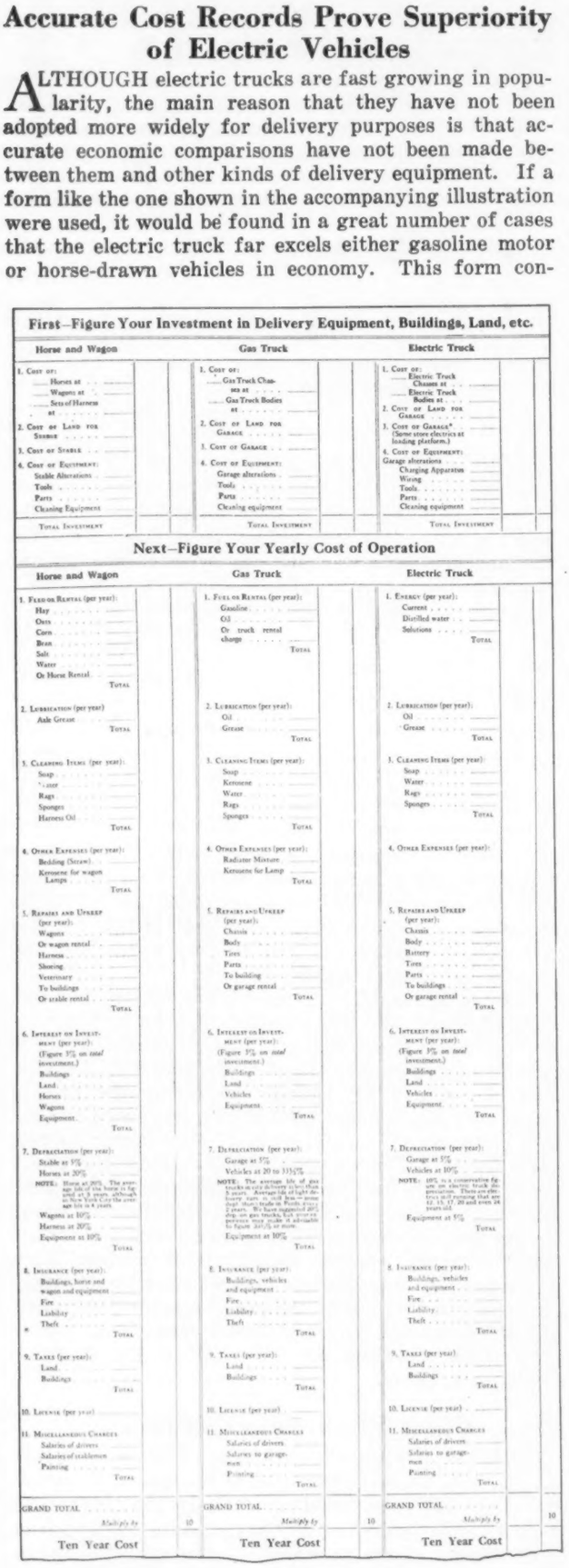
Glass Windows in Cell Doors

THE use of glass windows about 8 in. high and 14 in. wide placed at the level of the eye in oil-switch cell doors has been found advisable by the Pacific Gas & Electric Company, as they permit easy inspection of the interiors of the cells without removing the doors.

FIELD EDITOR ELECTRICAL WORLD.
San Francisco, Cal.

Accurate Cost Records Prove Superiority of Electric Vehicles

ALTHOUGH electric trucks are fast growing in popularity, the main reason that they have not been adopted more widely for delivery purposes is that accurate economic comparisons have not been made between them and other kinds of delivery equipment. If a form like the one shown in the accompanying illustration were used, it would be found in a great number of cases that the electric truck far excels either gasoline motor or horse-drawn vehicles in economy. This form contains parallel columns for all three types of vehicles. In each column may be itemized both investment cost and operating cost. The investment cost includes that for the truck or wagon, the cost of buildings, land and equipment. The cost of operation includes respectively the feed or rental and the fuel or rental for the horse-drawn and gasoline trucks, as well as the energy cost for the electric truck. In the same class are the costs for lubrication, cleaning, etc. Repairs and upkeep expenses come next, and then come interest on investment, depreciation, insurance, taxes, license and miscellaneous charges, including salaries. The total is then reduced to a ten-year basis for comparison.



First—Figure Your Investment in Delivery Equipment, Buildings, Land, etc.

Horse and Wagon	Gas Truck	Electric Truck
1. Cost of: ..... Horses at .... Wagons at .... Sets of Harness at ..... 2. Cost of Land for Stable ..... 3. Cost of Stable ..... 4. Cost of Equipment: Stable Alterations ..... Tools ..... Parts ..... Cleaning Equipment	1. Cost of: ..... Gas Truck Chassis at .... Gas Truck Bodies at ..... 2. Cost of Land for Garage ..... 3. Cost of Garage ..... 4. Cost of Equipment: Garage alterations ..... Tools ..... Parts ..... Cleaning equipment	1. Cost of: ..... Electric Truck Chassis at .... Electric Truck Bodies at ..... 2. Cost of Land for Garage ..... 3. Cost of Garage* (Some store electrics at loading platform.) 4. Cost of Equipment: Garage alterations ..... Charging Apparatus ..... Wiring ..... Tools ..... Parts ..... Cleaning equipment .....
Total Investment	Total Investment	Total Investment

Next—Figure Your Yearly Cost of Operation

Horse and Wagon	Gas Truck	Electric Truck
1. Feed or Rental (per year): Hay ..... Oats ..... Corn ..... Bran ..... Salt ..... Water ..... Or Horse Rental ..... Total	1. Fuel or Rental (per year): Gasoline ..... Oil ..... Or truck rental charge ..... Total	1. Energy (per year): Current ..... Distilled water ..... Solutions ..... Total
2. Lubrication (per year) Axle Grease ..... Total	2. Lubrication (per year): Oil ..... Grease ..... Total	2. Lubrication (per year): Oil ..... Grease ..... Total
3. Cleaning Items (per year): Soap ..... Water ..... Rags ..... Sponges ..... Harness Oil ..... Total	3. Cleaning Items (per year): Soap ..... Kerosene ..... Water ..... Rags ..... Sponges ..... Total	3. Cleaning Items (per year): Soap ..... Water ..... Rags ..... Sponges ..... Total
4. Other Expenses (per year): Bedding (Straw) ..... Kerosene for wagon Lamps ..... Total	4. Other Expenses (per year): Radiator Mixture ..... Kerosene for Lamp ..... Total	4. Other Expenses (per year):
5. Repairs and Upkeep (per year): Wagons ..... Or wagon rental ..... Harness ..... Shoeing ..... Veterinary ..... To buildings ..... Or stable rental ..... Total	5. Repairs and Upkeep (per year): Chassis ..... Body ..... Tires ..... Parts ..... To building ..... Or garage rental ..... Total	5. Repairs and Upkeep (per year): Chassis ..... Body ..... Battery ..... Tires ..... Parts ..... To buildings ..... Or garage rental ..... Total
6. Interest on Investment (per year): (Figure 5% on *total* investment.) Buildings ..... Land ..... Horses ..... Wagons ..... Equipment ..... Total	6. Interest on Investment (per year): (Figure 5% on *total* investment.) Buildings ..... Land ..... Vehicles ..... Equipment ..... Total	6. Interest on Investment (per year): (Figure 5% on *total* investment.) Buildings ..... Land ..... Vehicles ..... Equipment ..... Total
7. Depreciation (per year): Stable at 5% ..... Horses at 20% ..... NOTE: Horse at 20%. The average life of the horse is figured at 5 years, although in New York City the average life is 4 years. Wagons at 10% ..... Harness at 20% ..... Equipment at 10% ..... Total	7. Depreciation (per year): Garage at 5% ..... Vehicles at 20 to 33⅓% ..... NOTE. The average life of gas trucks in city delivery is less than five years. Average life of light delivery runs to 3 and less—some short trade in Florida runs 2 years. We have registered 20% dep. on gas trucks, but conservative men make it advisable to figure 33⅓% or more. Equipment at 10% ..... Total	7. Depreciation (per year): Garage at 5% ..... Vehicles at 10% ..... NOTE: 10% is a conservative figure on electric truck depreciation. There are electrics still running that are 12, 15, 17, 20 and even 24 years old. Equipment at 5% ..... Total
8. Insurance (per year): Buildings, horse and wagon and equipment ..... Fire ..... Liability ..... Theft ..... Total	8. Insurance (per year): Buildings, vehicles and equipment ..... Fire ..... Liability ..... Theft ..... Total	8. Insurance (per year): Buildings, vehicles and equipment ..... Fire ..... Liability ..... Theft ..... Total
9. Taxes (per year): Land ..... Buildings ..... Total	9. Taxes (per year): Land ..... Buildings ..... Total	9. Taxes (per year): Land ..... Buildings ..... Total
10. License (per year)	10. License (per year)	10. License (per year) .....
11. Miscellaneous Charges Salaries of drivers ..... Salaries of stablemen ..... Painting ..... Total	11. Miscellaneous Charges Salaries of drivers ..... Salaries to garagemen ..... Painting ..... Total	11. Miscellaneous Charges Salaries of drivers ..... Salaries to garagemen ..... Painting ..... Total
GRAND TOTAL ..... Multiply by	10	GRAND TOTAL ..... Multiply by	10	GRAND TOTAL ..... Multiply by	10
Ten Year Cost		Ten Year Cost		Ten Year Cost	

ACCURATE ECONOMIC COMPARISONS OF ELECTRIC TRUCKS WITH OTHER VEHICLES MAY BE MADE ON THIS FORM

One item which shows a large difference is that of depreciation. For horses, this is figured at 20 per cent, allowing an average life of five years, although in New York City the average life is only four years. Depreciation of gasoline trucks is figured as 20 per cent to 33⅓ per cent. This is on the basis that the average life of gasoline trucks in city delivery is less than five years. In fact the average life of light-delivery cars is still less, as in some instances cars are "traded in" every two years. The depreciation on the electric trucks is given as 10 per cent, although it is probably safe to say this is not more than 7½ per cent.

It may be surprising to some users of delivery vehicles to know that when costs have been checked in such a manner as this electric trucks have shown a saving of some 20 or 35 per cent and more compared with horses and wagons and with gasoline trucks on short-haul and frequent-stop routes. In this field the electric vehicle is pre-eminent.

It is a fallacy to place too great a consideration on the comparison of the first cost of electric trucks with the first cost of other vehicles. The saving in operating expenses during a period of ten years or some such period will more than offset the higher price of the "electric." Moreover, the first cost of one electric truck cannot be compared with the first cost of one horse and wagon or one gasoline truck, because the electric truck will last so much longer that even the investment cost when prorated per year will be less for the electric truck. To convince the users of trucks of the economy of electric vehicles, many of the manufacturers are willing to make analyses of delivery cost at no expense to the user.

The form which is shown here as a good example has been prepared by the Ward Motor Vehicle Company.

Individual Induction-Motor Power Factor Correction Urged

THERE is little difficulty in correcting for power factor by the use of the static condenser at the individual motor, but the use of such equipment has been retarded commercially, said William C. L. Eglin, chief engineer Philadelphia Electric Company, in a recent address delivered before the New England Division of the N. E. L. A. No real manufacturing difficulty exists in making a condenser for induction-motor service which can be applied at each machine and in sizes suitable for this purpose.

Mr. Eglin's company had imported condensers from France for test purposes at a cost of about 45 cents per microfarad of capacity, or $50 to $55 for correcting a 5-hp. motor. Through the co-operative work of the N. E. L. A. and the manufacturers of electrical machinery in this country it is hoped that the building of

static condensers may be standardized, and that they may be produced in compact sections which will permit adjustment to meet local conditions and quick replacement of units in case of trouble. With the load upon modern central stations doubling every five years, the time is at hand when it will not be possible to take on any more business at poor power factors unless corrective devices are added. The speaker favored the use of individual condensers and pointed out that through the improved power factor and reduction or elimination of penalties the consumer will save the price of the condenser in a year or two. In many cases the rate offers the customer 50 to 100 per cent return on the investment in corrective apparatus.

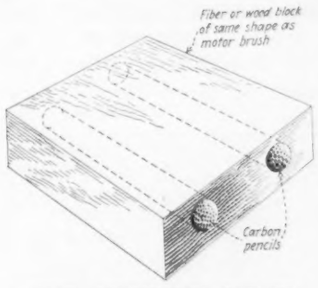
Boston, Mass. FIELD EDITOR ELECTRICAL WORLD.

Brush Setting on Interpole Machines

ALTHOUGH setting brushes on interpole machines is well understood and taken care of in plants making electrical machines, this work is often done improperly outside such plants, owing to lack of experience or failure to realize the importance of the matter to good operation. Proper brush setting on all interpole machines is far more important than on machines without interpoles for the reason that such machines are more sensitive to any brush shift. After the brushes are once properly set they should require no shifting for any variation in load or direction of rotation.

For proper setting the brush-holder studs must all be parallel with the shaft of the machine or commutator bars and equally spaced around the commutator. This is generally checked by the use of a strip of strong ribbon paper, about 1 in. wide, which is first passed around the commutator and marked to get the circumference, after which it is divided into the same number of parts as there are brush studs on the machine. It is then placed around the commutator again, starting with one set of brushes on one mark of the paper and seeing that all the other sets of brushes are in the same relative position to the markings on the paper as the first set are. The brushes should then be carefully seated with fairly fine sandpaper so as to bring the entire wearing surface of every brush in contact with the commutator. For machines without interpoles the brushes are simply shifted over the bars that are connected to the conductors, which are midway between the poles of the machine before starting up and later adjusted for the best position under running operation. The rocker arm or brush holder is generally marked approximately by a pointer or by a red-paint mark. On interpole machines the rocker arm is marked generally with a cold chisel, giving a definite position, which is carefully determined by tests. There are several methods of finding the neutral, the best no doubt for a motor being that of reversing the machine. In this method the motor is reversed back and forth and the brushes are shifted until virtually the same current, voltage and r.p.m. readings are obtained in either direction at no load and at full load.

On generators that are to run in one direction only the "fiber-brush" method is very good. In this case one of the brushes is replaced by one made of fiber or wood like that shown in the accompanying drawing, having two small holes drilled parallel with the brush through which two small carbon pencils can be inserted. The holes must be so drilled that one pencil slightly leads the other as they are pressed against the commutator. Voltage readings are then taken between the pencils while the machine is running. The brushes are shifted until the meter shows the least deflection under no load and at full load. The voltmeter reading simply shows the difference of voltage between the heel and the toe of the brush, and this should be lowest in a certain brush position for both no load and full load. If not found so, it would indicate that the interpoles were not of the proper strength and require adjusting, which, however, should seldom be necessary except at the time the machine is built.



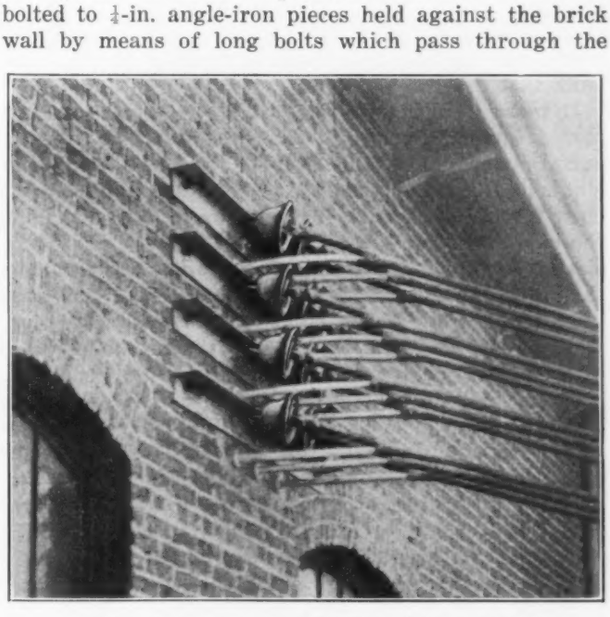
FIBER BRUSH FOR USE IN SETTING BRUSHES ON NEUTRAL POSITION

A simpler and easier method commonly used for locating the neutral is to connect a millivoltmeter across brushes of opposite polarity while the machine is standing still and note the kick of the voltmeter needle while throwing line voltage on and off the shunt field. When the kick is least brushes are set in neutral position.

East Orange, N. J. PHILIP G. BERNHOLZ.

Secure Dead-Ending for Heavy Cables at Building Entrance

AN EXAMPLE of a very strong method of dead-ending heavy cables at their entrance to a building is given in the accompanying illustrations. The cables are spliced to small suspension insulators which are bolted to ¼-in. angle-iron pieces held against the brick wall by means of long bolts which pass through the



STRONG DEAD-END SUPPORT FOR HEAVY CABLES

walls and through corresponding angle-iron pieces on the other side of the wall. The cables are run through the wall in porcelain tubes.

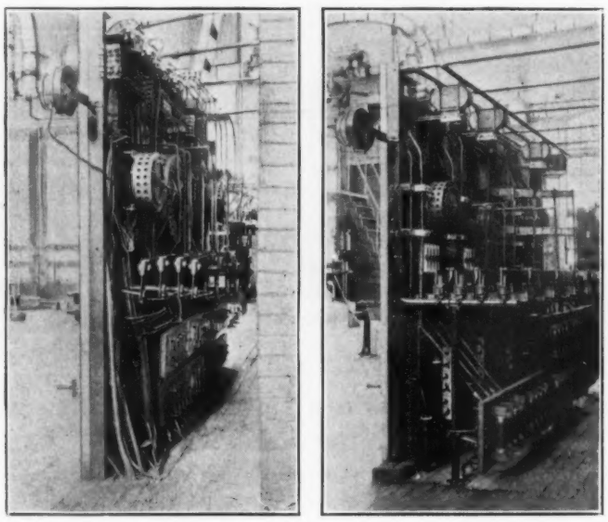
This substantial method of supporting the cables keeps them in place without any swinging and allows a very compact arrangement.

FIELD EDITOR ELECTRICAL WORLD.

New York, N. Y.

Troublesome Switchboard Gives Perfect Service After Remodeling

AN EXAMPLE of the bad and the good in switchboard wiring is shown in the accompanying illustrations of the 440-volt board which was remodeled in a Southern plant. Although this board had been installed less than four years, it had become the seat of repeated and expensive troubles by reason of short circuits and burn-outs due to confused wiring, small clearances and open fuses. It cost the owner about $1,000 to rebuild this board, as shown at the right,



POORLY DESIGNED SWITCHBOARD AND HOW IT WAS REMODELED

about four years ago. The expense has proved well worth while as there has been no trouble on the board since that time.

In making the change the switchboard itself was first moved further from the wall, clearances between conductors were increased, every superfluous wire was eliminated, and inclosed fuses were substituted for the open fuses. Small control wiring was run neatly along the surface of the board, to which it was fastened by cleats. The potential transformers were removed from their position against the top of the board and were hung from iron straps supported by the new pipes which were run from the wall to the board. Instead of a mass of open wires along the top of the board, the circuits from these potential transformers were run in conduit at one side of the transformers. The buses were originally supported on long studs which passed through the board, and they were placed too close together. For the new bus supports iron-pipe upright pieces and cross-pieces were fastened securely to the floor and the switchboard. On these pieces were clamped busbar insulators with a sufficient space between.

For the leads from the buses to the posts of the switches copper straps were employed in place of the more flexible insulated wire which was originally installed.

The fuses were mounted on slate panels, which were attached to the upright pipes back of the boards. The leads from below were brought up through the floor in conduit which extended as high as possible. Where it was necessary to run them open behind the board, they were run in straight lines and supported at intervals with porcelain cleats. Wherever it was possible, wires running parallel and close to each other were wrapped with cord and taped on the outside, thus making a neat and safe job.

This change-over was accomplished without interrupting the daily service of the plant by Huntington & Guerry, Inc., Greenville, S. C.

FIELD EDITOR ELECTRICAL WORLD.

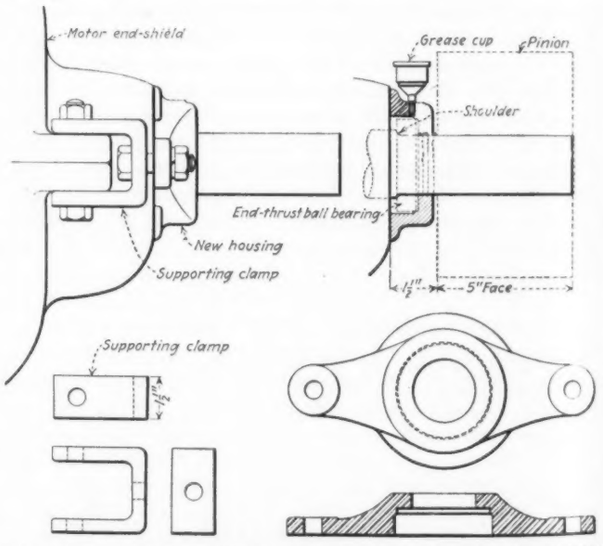
New York, N. Y.

Adapting Standard Motors for Operation When Tipped 20 Deg.

IN A RECENT installation of motors it was found that it would be very desirable to operate them when tipped at an angle of about 20 deg. from the horizontal. As the motors had the standard ring-oiling bearings, it was impracticable to operate them as they were, because the rings would not rotate, the oil would leak out and there was no provision for taking the end thrust now to be put on the bearings. Exchanging the motors for such as were designed for this sort of service was found to be extremely costly in time as well as money, so that some other expedient had to be found.

As shown in the accompanying sketch, the motor shafts had a light shoulder where they entered the bearings. For this reason a ball thrust bearing could be held up against this shoulder by means of a cast-steel housing. This simple housing, its bearing and the clamp for attaching to the motor frame were so designed as to require no machine work on the motors but just bolting on through bolt holes already in place. Spring compression grease cups were provided to keep the housing full, thus preventing the entrance of dust. When made up this appliance was so small that it was entirely hidden behind the motor pinion.

The ring oilers with their sleeves were removed from



HOUSING FOR BALL BEARING BOLTED TO MOTOR FOR OPERATION WHEN TIPPED FROM LEVEL POSITION

the bearings and new liners put in their stead. These had larger, wider openings for allowing the waste with which the bearings were now packed to come into contact with the shafts. These motors now operate with entire satisfaction under the new conditions.

Chicago, Ill. THOMAS NAF.

Management and Policy

Embracing Central Station Commercial Organization and Management, Customer and Trade Relationships, Public and Financial Policies, Advertising, Selling and Service Methods

Some Utility Duties and Opportunities

A Suggestion from a Recent Address by William C. Lounsbury, President of the Great Lakes Section, N. E. L. A.

IN THE great advertising campaign for popular good will toward central-station companies which the leading manufacturers have been carrying on we find an excellent example of co-operation. "Co-operate with Your Public Utility—Help It to Help You," is a typical heading to much valuable advertising our industry has received from the manufacturers. It is a straightforward attempt on their part to help us. Have we as local central stations done as much for the small contractor as the manufacturer and large contractor have done for us? The man who is selling washing machines, vacuum cleaners, motors and the like is just as surely working for our business as he is for his own, for every appliance sold adds potentially just so much to the central-station output.

W. C. LOUNSBURY

A very determined effort is now being made to present public utility problems fairly, frankly and honestly before the people. We are very actively engaged in this work. In the program of information for the public, however, it has become very clear to its leaders that the utility managers themselves need quite as much education as does the public. That the manager is learning his lesson is shown in many ways and places by the changed attitude of the utility official toward the public. He is becoming convinced that his is indeed a public business and that it is the public which he must serve.

But when we talk about the education of the public do we really have a true conception of those who compose the public? Are we not too prone to think that the very few men and women with whom we personally come in contact and whose views we hear constitute the public? This is quite as foolish as thinking that the few hundred or thousand words which constitute our vocabulary and which we have at our command make up the dictionary. None of us gets close enough to the mass. We are too much influenced by the few individuals with whom we are in personal contact.

I conceive of the public as a great complex organism always changing, swaying, yet strangely enough acting as a highly intelligent unit according to the knowledge which it has or believes it has at the moment. Are we too frequently misled by those who profess to speak for the public? The public utility is comparatively new. The public senses a potential danger in such an organization. We have allowed the irresponsible politician to play upon this intangible fear of the utility. Let us inform and educate the public, but let us make sure that we are honest about it and attempt to reach all of the people and not only those who may be interested in our securities or just those who are reading our leading magazines.

After all, the place to reach ultimately the great mass of people is through the public school. Here we find together children from families representing every shade of political opinion and religious belief. Could not the central-station company arrange to have the children in the schools become more familiar with our business through their courses of study? I feel very certain that it would be a good thing for the children if simple electrical problems were taught them and they learned the nature of our business and those truths which we are now trying to get to the readers of the national magazines.

Interesting the Employees as the Front Rank of the People

ONE of the secrets of the success which has been attained in the selling of securities to customers of the Central Maine Power Company has been the fact that the company has kept continually "selling" itself to its own employees. An interesting illustration is seen in recent issues of the company's weekly house organ, the *Exciter*, in which the course of the construction of a new dam and hydro-electric plant at Skowhegan has been pictured, and described. The building of this new capacity has supplied a running human-interest story that has steadily engaged the attention of the entire personnel of the company, although many are not directly affected in any way and may never see the dam itself.

The body of employees, however, is after all the first rank of the people and the contact point with the community. Their interest is translated into public interest by telling them this story of the progress of the work and the engineering problems involved.

Employees have thus been able to talk intelligently about what the company is doing to improve and extend its service, and their enthusiasm is passed along. The Central Maine Power Company financed the Skowhegan dam chiefly through the sale by employees of its preferred stock. By showing the progress of the work employees have had concrete evidence of what their stock sales have meant to the company in making possible a new power plant, and their activity in pushing more sales for further construction has been greatly stimulated.

Arkansas Newspaper Cites Utility's Preparedness in Strike Warning

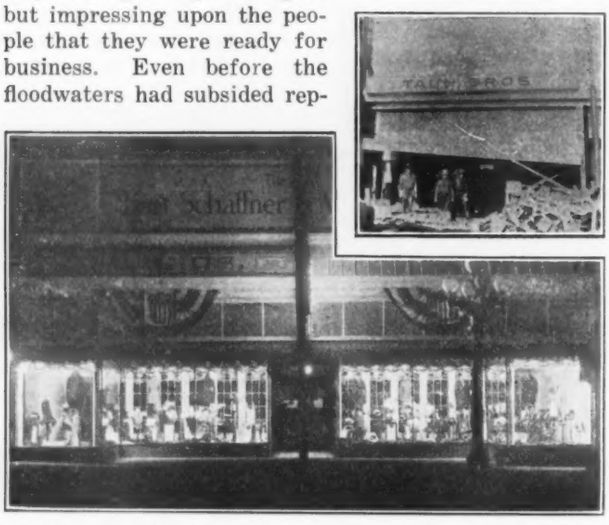
THIS editorial expression from the Helena (Ark.) *World* is an unusually interesting example of the value of newspaper appreciation. In the course of an editorial on the railway strike under the title "How Many Are Prepared?" the paper says:

> There is one important institution in Helena which can operate for sixty days whether there is or isn't a general railroad strike, and the very existence of this institution depends upon its ability to get coal and plenty of it. This is the Helena Gas & Electric Company, whose manager told us yesterday that ample provision had been made for contingencies. Weeks ago orders had been placed for large shipments of coal. There were already about two average trainloads of coal in the company bins. Now the railroad strike can go right ahead without interfering in the least with the city's gas and electric service.
>
> We wonder how many other business and industrial institutions have read between the lines and prepared for eventualities as Mr. Wharton has done for the gas and electric company.

The benefits which come of good relations with the press and people bring help at times most unexpected. In this case J. S. M. Wharton, general manager of the Helena Gas & Electric Company, by his good administration of his company's affairs has won the sympathy and understanding of the newspapers, and when the threatened railway strike became the general topic of discussion the editor gladly used the preparedness of the utility as a text for a sermon to other local industries.

Pueblo Disaster Has Resulted in Much Electrical Activity

ELECTRIC light has played a most conspicuous part in the resurrection of the city of Pueblo after the severe flood disaster in Colorado a few months ago. Large numbers of stores and business buildings were almost wrecked in so far as stock and equipment were concerned, and the merchants faced the necessity of not only setting things to rights but impressing upon the people that they were ready for business. Even before the floodwaters had subsided rep-



VIEWS OF PUEBLO STORE JUST AFTER FLOOD AND A FEW MONTHS LATER WITH IMPROVED ILLUMINATION

resentatives of the Arkansas Valley Railway, Light & Power Company of Pueblo visited the merchants whose stores and electrical equipment had been damaged, ready to help in every possible way. This offer was gladly accepted, and as a result of the company's endeavors, Pueblo has been reborn electrically. The two pictures here show a men's furnishing store immediately after the flood and its complete recovery a few months later equipped with the latest type of window lighting.

"The merchants generally," says W. F. Raber, general manager of the company, "responded to our suggestions for better illumination and electric advertising. The interior, exterior, window and sign lighting is now much better than it was previous to the flood. Decorative lighting has been greatly improved and by the end of this month (October) we shall have reconnected, with an increase in connected load, virtually all customers that we had prior to the flood."

In other words, the central-station company in times of disaster is in a position to render a vital service in helping its afflicted customers to get back on their feet, and in the process it inevitably sets up a new standard of electric lighting and equipment that makes old installations look poorly in comparison. The result is new and unexpected opportunity both for the business men and for the utilty.

What Other Companies Are Doing—

Youngstown, Ohio.—The Pennsylvania-Ohio Power & Light Company is offering its 8 per cent preferred stock to customers and reports that employees have already subscribed for $196,000 of the issue. G. T. Seeley, vice-president and general manager, states that the proceeds will be used to make extensions and improvements, and he is of the opinion that there is a sufficient supply of local money to assure the placing of the entire issue at home.

Missouri.—Central station companies are very much interested in a potential market for rural electric service in this state. According to the preliminary statement of the Missouri Co-operative Crop Reporting Service at Jefferson City 20,523 farms have a general lighting system of some sort. There is a total of 8,006 isolated electric lighting plants installed on different farms, only 3,133 farms obtain service from central station companies and 9,384 farms are equipped with acetylene lighting plants.

Montreal, Que.—The Electric Service Corporation, distributer of power in and around Montreal, is actively engaged in popularizing the use of electric appliances. The company has inaugurated a plan of holding exhibitions in different towns, one of which was recently staged at St. Tite, Que., which lasted a week. A number of irons, electric stoves, washing machines and other appliances were sold. It is the intention of the company to have special motor trucks for the transportation of this material from town to town and village to village, where exhibitions will be given.

Elmira, N. Y.—For the first six months of 1921 the electrical merchandising sales of the Elmira Water, Light & Railroad Company totaled $30,085 and for the first six months of 1920 they were $12,644, showing an increase this year of $17,441. This increased business is attributed by M. F. Houston, sales engineer of the company, to an intensive sales effort on the part of the commercial department backed up by an increased amount of advertising. During January of this year the company, in co-operation with local contractors, jobbers and dealers, conducted an electrical show, from which good results were obtained at the time and the beneficial effect is still felt in the territory.

Digest of Electrical Literature

Including Brief Abstracts of and References to
Important Articles Appearing in the Scientific and Engineering Press
of the World

Generators, Motors and Transformers

Determination of the Coil-End Reactance of Turbo-Generators.—R. POHL.—The reactance of the stator winding of a turbo-generator is almost the only factor which determines the magnitude of the impulse amplitude of the short-circuit current. The largest part of this reactance is found to be in the coil ends, and it is difficult, if at all possible, to calculate it or even to measure it by actual test. The author shows a novel method of attacking this problem. It is easily possible to measure accurately the reactance voltage of the generator when its armature is removed and to determine the amount of increased teeth leakage over that of the complete machine. Dr. Pohl derives simple relations between the teeth leakage and the corresponding emfs. of two pole generators without armatures and proves the exactness of these relations by a number of actual measurements. He deducts further the core reactance and isolates thereby the desired coil-end reactance. If this method is carried out first with all three phases, then with two and finally with one phase, it is possible to find the mutual inductance between the coil ends.—*Elektrotechnische Zeitschrift*, Sept. 22, 1921.

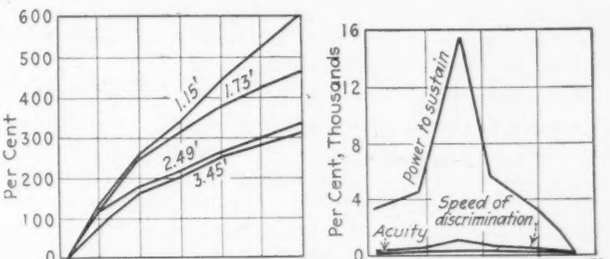
Generation, Transmission and Distribution

Swiss 135-Kv. Outdoor Switching Station.—At Gösgen, Switzerland, there is an important point for several intersecting trunk lines of the 135-kv. and 50-kv. lines of the network of the Schweizer Kraftübertragungs company. After long deliberation between the advantages and disadvantages of an open-air as against a housed-in switching station the Swiss authorities decided upon the former and erected what is believed to be the first Swiss high-voltage outdoor switching station, built after American models. It is said that the cost of this station amounts to only about 4 francs per cubic meter as against 25 francs to 30 francs for an indoor station. At the same time an indoor station would have required 20 per cent more floor space. Of the total cost of the station 25 per cent was building cost, whereas for an inclosed station the cost of building would have been from 50 to 60 per cent of the total cost. To test the merits of different makes of switches three types have been installed, General Electric, Brown-Boveri and Sprecher & Schuch. With the exception of open air-core choke coils, no protective apparatus has been installed, but great stress is laid upon the inherent safety of the design of the apparatus itself. Eight-unit chain insulators are used throughout, and 1-in. (2.5-cm.) steel piping forms the busbars.—*Bulletin de l'Association Suisse des Electriciens*, September, 1921.

Tidal Power and Long-Distance Transmission.—P. F. WALL.—This paper describes the use of alternating-current generators driven directly from turbines operated under a varying head such as results in a tidal-water power system. The frequency of the alternating current and the length of the transmission line are so related that as the speed of the turbines increases the frequency will increase correspondingly, and at the same time, if the excitation is constant, the generated voltage will increase correspondingly. The system is such that with constant current at the receiving end of the line, notwithstanding the rise of generator voltage as the speed rises, the voltage at the receiving end will remain constant.—London *Electrician*, Sept. 30, 1921.

Lamps and Lighting

Effect of Intensity and Composition of Light on Ocular Relations.—C. E. FERREE and GERTRUDE RAND.—This paper describes the effect of angle of vision, intensity and composition of light upon visual acuity, speed of discrimination and the power to sustain acuity. Results



CHANGE OF OCULAR PERFORMANCE WITH CHANGING INTENSITY AND WAVE LENGTH OF LIGHT

Left—Percentage gain in speed of discrimination plotted against foot-candles for various visual angles. Right—Percentage change of functions with varying wave length. The value for blue is the base on which changes are calculated.

of observers for various visual angles are plotted. As might be expected, the speed of discrimination increased with increasing candlepower. The functions most affected by the change of wave lengths as shown from the accompanying curve are, first, the power to sustain acuity; next in order, speed of discrimination, and, last, acuity. So far as has been determined, this order of ranking holds for whatever affects the powers of the eye. From the standpoint of testing, therefore, the power to sustain acuity affords the most sensitive basis for detecting small disturbances in the eye. The speed of discrimination, however, is a very sensitive test and more feasible for general laboratory purposes than tests on power to sustain.—Paper presented before Illuminating Engineering Society, Sept. 26, 1921.

Traction

Operating Results on the Electrified Riksgränsen Road.—E. WIST.—The author reviews the results obtained during the six years of operation of the 250-km. Riksgränsen road in Sweden (15,000 volts, single-phase, 15 cycles). There are twenty locomotives of the "1C + C1," "2B2" and "B + B" types in use, and twenty-five new engines are on order. During the year 1920 the average distance traveled by each locomotive was 33,000 km. Under favorable climatic conditions each locomotive covers 520 km. daily for six consecutive

days. The commutators must be trued up (turned) every 50,000 km. After every 25,000 km. the bearings of the coupling rods must be relined and motor and jack-shaft bearings be refitted. After 50,000 km. all bearings are relined and compressors, blowers and contactors are repaired. After 100,000 km. the tires are turned off. Each locomotive is inspected every week, the task taking one day. The great overhaul after each 100,000 km. takes usually four weeks. The engines use 39 kg. of lubricant for every 1,000 km. The output of the electric locomotives proved to be considerably higher than expected, and to increase the output of the road it was not necessary to build a second track, as would have been the case if steam traction had been maintained.—*Elektrotechnik und Maschinenbau*, Sept. 25, 1921.

Installations, Systems and Appliances

Portable Vacuum Thermopile.—W. W. COBLENTZ.—A description is given of a vacuum thermopile container rendered portable by attaching the calcium evacuator permanently to the receptacle. Directions are given for operating the device. The paper also gives some observations extending over a period of about seven years on the behavior of vacuum thermopiles in which the vacuum is maintained by means of calcium.—*Bureau of Standards Bulletin No. 413.*

Reversible Electric Valve Tube.—H. GREINACHER.—For some purposes where one-way electric valve tubes are used it would be desirable to reverse their valve action without any change in the electric connections. This has been made possible by a new valve tube designed by the author and manufactured by E. Gundelach. The tube consists of a spherical glass bulb with two cylindrical ends, containing each a short leading-in wire. Between the two cylindrical ends an aluminum tube, insulated from the two electrodes, is stretched. Within this metal tube is a small aluminum ball. If this apparatus is tilted to the left side, the ball rolls down to the left and makes contact between the left leading-in wire and the tube, so that in this position the left electrode is large and cylindrical and the right electrode just a short piece of wire, resulting in a certain valve action. A slight tilt in the opposite direction makes the ball roll over to the other side, when the characteristic and valve action of the tube will be reversed. A clever little device.—*Elektrotechnische Zeitschrift*, Sept. 15, 1921.

Electrochemistry and Batteries

Recent Developments in Electric Furnaces of the Muffled Arc Type.—H. A. WINNE.—A description of muffled-arc melting furnaces. Smaller units of 1,500 lb. and less per hour capacity are described in comparison with the larger rectangular shell-type furnace. The advantages of muffle-arc furnaces are that little space for heating elements is required, metal losses by volatilization are reduced, a neutral or reducing atmosphere is maintained and load fluctuations are small. They are adaptable to intermittent operation. Other features are accessibility of hearth, low electrode consumption and small expense of refractories.—Paper presented before the American Electrochemical Society, Sept. 30, 1921.

The Electric Furnace Melting of Nickel Silver.—F. C. THOMPSON.—The author presents the advantages of the externally heated electric furnace for nickel-silver melting, in so far as (a) loss of zinc is reduced to less than 1 per cent, (b) occlusion of gases is minimized, and (c) a tougher alloy results owing to less carburization.—Paper presented before the American Electrochemical Society, Sept. 30, 1921.

Units, Measurements and Instruments

Measuring of High-Frequency Losses of Glass and Other Dielectrics.—E. SCHOTT.—Germany lacked mica during the war and was forced to find a suitable substitute, for which glass was recommended in first place. A method had to be devised to measure reliably the dielectric constants of glass under high frequency. If the dielectric of a condenser is a perfect insulator, its capacity causes a current leading the charging voltage at 90 deg. Any imperfectly insulating dielectric will cause a phase displacement of less than 90 deg. (90 minus δ, δ being called the loss angle). It was necessary to find a very delicate measuring method, as the angle δ is very small for good dielectrics, sometimes only fractions of one minute. The method used consisted of a sending circuit (1) generating the desired frequency, a measuring circuit (2) loosely coupled with the sender, and an indicating circuit (3). Circuit 2 contained a fine variometer, a variable resistor and the tested condenser. When these three circuits were brought into resonance, the instrument in circuit 3 gave a certain deflection, and by substituting a standard air condenser for the tested condenser in circuit 2 and varying the resistance until the same deflection was obtained in circuit 3 sufficient data were obtained to determine the characteristics of the tested condenser. The detailed article gives an account of the many difficulties which had to be overcome to carry out this apparently simple method, and tabulations of results obtained on different kinds of glass, quartz and artificial amber are given.—*Jahrbuch der Drahtlosen Telegraphie und Telephonie*, August, 1921.

Telegraphy, Telephony and Signals

Transatlantic Radio Station at Eilvese.—F. LINKE.—Before describing the actual equipment of the Eilvese station, which operates with Goldschmidt generators, the author gives an excellent account of the development, the theory and the constructive details of the Goldschmidt medium-frequency generators, manufactured by the C. Lorenz Company in Berlin. The power supply for this radio station is taken from the Weser power station as three-phase, 15,000-volt current, and is transformed to 5,000 volts before it is rectified in a 600-hp. motor-generator set consisting of one alternating-current motor and two direct-current dynamos, one for 220 volts, the other for 440 volts. The 440-volt generator feeds the high-frequency machines. To be assured of continuity of service there are also installed five Diesel oil engines of 200 hp. each. For the regular telegraph service 400 hp. to 600 hp. is needed. There are two antennas, one of the so-called umbrella type for waves of 7,000 m. to 12,000 m. length and a ring type for longer waves. These two antennas are well insulated from each other electrically. The main tower is 250 m. high and the six smaller towers are 112 m. high. Six weights of 1,500 kg. each keep the wire network under proper tension mechanically. The receiving station is at Hager, 5 km. from Eilvese, and is connected to two 5-km. straight-line antennas, laid out and built like a double high-tension line on poles with disk-type insulators, with two wires 10 m. above ground and two wires 20 m. above ground, both lines on the same poles, one above the other. The corresponding Goldschmidt station in America is at Tuckerton, N. J.—*Zeitschrift des Vereines Deutscher Ingenieure*, Aug. 20, 1921.

News of the Industry

Chronicle of Important Events and General Activities in the Technical, Commercial and Manufacturing Fields With Announcements and Reports of Association Meetings and Conventions

Florida Storm Does Slight Damage to Lighting Companies

ALTHOUGH exact estimates are not available from scores of small plants throughout the state, damage aggregating probably $300,000 was done to electric systems within the storm area of Florida last week. From Dunnellon and Ocala on the north to Fort Myers on the south, and from west coast to east coast, there were lighting and telephone and telegraph poles down—on every hand along the west coast, with fewer comparatively as the state was crossed. Damage was also lighter north of Dade City and south of Arcadia.

The loss to the Tampa Electric Company will run close to $200,000, incurred principally through the washing out of nearly 5 miles of track with brick pavement along the bay shore drive to Ballast Point. Scores of poles were snapped off throughout the city and hundreds shoved over. Remarkably rapid work by linemen permitted resumption of service down town the night after the storm, and within ninety-six hours the entire system, stretching 15 miles north and south and 11 east and west, was getting service. Street cars were running within fifty hours on all except the wrecked Ballast Point line.

Damage to the St. Petersburg municipal lighting plant will not be more than $25,000, according to C. E. Ludwig, director of utilities. This includes the loss of close to a half mile of track and trolley when the bayfront pier was washed away. Other damage throughout the section was confined almost solely to snapped poles and twisted wires.

Attempt in Illinois to Justify Ground-Return Telephone Circuits

ANOTHER case of national importance involving the use of ground-return telephone lines as a permissible standard for rural telephone service came before the Illinois Commerce Commission in Chicago Wednesday and Thursday of last week. The Lena Electric Light & Power Company and some other companies connected with it through transmission lines, together with a number of small rural telephone companies, were cited to appear before the commission in an investigation of inductive interference. At previous hearings the telephone companies through witnesses set up the contention that the ground-return line was modern and standard practice for the serving of rural consumers and that the paralleling power companies must assume the burden of metallizing the telephone circuits to correct interference troubles.

At the hearing which took place last week expert testimony was introduced to show that the ground-return circuits were not proper practice and also to show that the physical condition of the existing ground-return circuits is very poor. The voltage of the transmission circuits of the Lena company is 33 kv. The properties which are involved are all in the northwestern part of Illinois.

Muscle Shoals Development in Statu Quo

IF THE Secretary of War saw anything during his personal visit to Muscle Shoals which will influence him in the consideration of Henry Ford's offer, he is not talking about it. His comment on his impressions was avowedly meager so that he might be left freer to negotiate with Mr. Ford. Secretary Weeks said on Oct. 31 that he was inviting Mr. Ford to come to Washington, but no date was suggested in the Secretary's letter to the Detroit capitalist. Some are of the opinion that before Secretary Weeks and Mr. Ford can get down to actual bargaining another conference between the latter's engineers and the engineers of the army will be necessary.

In connection with the proposal that the government's steam plant at Muscle Shoals be leased to help the Southeastern power companies tide over their shortage of power, Secretary Weeks said that it would be difficult to make such an arrangement in view of the negotiations that are pending. He expressed the opinion that the Wilson Dam could be completed for $22,000,000.

Statement of Controversy Between Coast and National Contractor-Dealers

THE National Association of Electrical Contractors and Dealers has issued a statement covering the details of its controversy with the electrical contractors and dealers represented by the California State Association of Electrical Contractors and Dealers, the Oregon Association of Electrical Contractors and Dealers and the Washington Association of Contractors and Dealers. These three state organizations have recently announced their secession from the national body.

The national association states that the basis of the difference rests on three clauses of the national constitution and bylaws which stipulate that "the state associations affiliated with the national shall adopt the form of constitution and bylaws prescribed by the national association; that all members of such affiliated state associations must affiliate with the national association, and that the dues of the members shall be payable semi-annually in advance." These rules were automatically accepted in behalf of the state memberships by the California, Oregon and Washington groups when they joined the national body. California had ninety-two members, Oregon thirty-nine and Washington thirty. These members paid an average of $9.12 per member for the year, as compared with $12, the average for the country.

Differences of opinion having arisen on the subject of the payment of dues quarterly through the California

state secretary instead of semi-annually direct from members as the bylaws proscribe, a representative of the national association visited the state headquarters and there learned, according to the statement, that the actual membership of the California association numbered three hundred paying $60 a year dues, of whom but ninety-two had been enrolled as members of the national association. A conference between representatives of the three coast bodies and the national association followed, in which the coast group applied for reduced membership dues and for an allowance from the national treasury to cover the expenses of representatives of the three Pacific groups in attending a Pacific Coast conference twice a year and the expenses of a Pacific Coast national committeeman in attending a national executive committee meeting once a year, the appropriation not to exceed $1,600. The national association agreed to pay this amount if the other matters in dispute were adjusted in accordance with the national constitution. These stipulations were not accepted, and the Coast groups then suggested that they should receive a flat appropriation of $800 out of their dues, then aggregating $1,300 a year, and not look to the national association for any traveling expense. The national association held to its former proposition, offering $1,600, but refused to reduce its dues in favor of any one section of the country and required that the terms of the constitution be adhered to. The formal secession of the three state groups followed.

Local Security Ownership Indorsed by West Virginia Utilities

ASSERTING that the chief trouble with public utilities in West Virginia is that most of them are owned by outside companies, George R. C. Wiles, chairman of the State Public Service Commission, made a plea before the annual convention of the Public Utilities Association of West Virginia, held on Oct. 20-21 in Charleston, for the ownership of bonds within the community served. A. H. Grimsley, general manager of the Virginia-Western Power Company, Clifton Forge, Va., explained the methods used to achieve this end in his territory, and C. P. Billings of the Wheeling Traction Company expressed his faith in the movement.

J. S. Jenks, vice-president of the West Penn Power Company, Pittsburgh, outlined the progress of the electric industry in the last twenty years and predicted that it would become the greatest of all industries. He thought that with the wider use of electricity there would come a slight recession in its price, after which the price would tend to become stable.

Governor Morgan, who was formerly chairman of the Public Service Commission, in speaking at the annual banquet, expressed the commission's point of view and Fred M. Staunton spoke for the utilities. In an address on "The Pressing Problems of Public Utilities," James P. Barnes, president of the Louisville Railway Company, declared that clean publicity is for the corporation what clean living is for the individual.

The men already in office were re-elected as follows: President, Herbert Markle, general manager Appalachian Power Company, Bluefield; first vice-president, C. P. Billings, general manager Wheeling Traction Company; second vice-president, Mentor Hetzer, Moundsville Water Company; third vice-president, E. T. Alexander, general manager Dunbar Traction Company, Charleston; secretary, A. Bliss McCram, Charleston.

Future Electrification Discussed Before Mining Congress

THE future electrifications of the mining industry can be classified into three groups, according to a paper presented by Graham Bright of Pittsburgh recently before the American Mining Congress at Chicago. These groups are, first, the displacement of manual labor; second, the supplanting of present steam drive by electric power; third, the development of new metallurgical processes. Electric power will replace manual labor more and more as the supply of cheap labor continues to decrease and as the laboring man develops an objection to monotonous occupation—an objection always incident to an improvement in the standard of living.

Mr. Bright pointed out that a great opportunity for the lowering of metallurgical costs lies in the commercial development of processes using electric power directly for the production of thermal effects and for electrolytic action. Great strides are being made in direct precipitation of pure metal from liquors produced by the direct leaching of mine ores, as in the production of copper at the plant of the New Cornelia Copper Company at Ajo, Ariz.

WAYS TO REDUCE POWER COSTS

Mr. Bright also instanced three ways in which a mine operator could reduce his cost per ton mined by the proper utilization of electric power. The first is the proper selection of apparatus to do the work, thereby reducing the power consumption per unit of work accomplished, eliminating interruptions in operations and decreasing the item of labor required for carrying on the process and for the maintenance of the equipment.

Synchronous motors about mines offer a fruitful field for reduction of costs because of better power-factor correction, thereby increasing the capacity of transformer stations, and also because power companies are willing to make concessions in this matter.

The second way of reducing cost lies in the proper scheduling of operations in order to use the power purchased or generated to best advantage. Frequently, Mr. Bright said, a great saving can be accomplished by the elimination of peak demands that might arise from the concentrated or simultaneous performance of operations which by proper scheduling could be arranged to succeed one another so that their power demands would not be coincident. An example of this scheduling would be the charging of storage batteries during the "off" shift.

The last way concerns the possibility of reducing the unit cost of power by a superpower system which would further stimulate the use of electricity because the power supply would be virtually free from interruption and continuity of service would be effectively perfect. The production of power could be cared for in efficient large units, and the wasteful small plant operating at poor load factor could be discarded. The very large diversity factor in the loading of such a system would permit operating all generating equipment and all trunk-line transmission buses at very high load factor with consequent economy.

Mr. Bright said that about 20 per cent of the energy generated in the Western States by public service corporations for the year 1920 was used by the mining industry.

Further Hearings to Be Held on Water-Power Accounting Regulations

A REQUEST for a further hearing on the accounting regulations has been made of the Federal Power Commission by the National Electric Light Association. The request will be granted. The date has not been set, but it will be arranged so that the hearing can be had before the end of November.

General Electric Lamp Patents Again Upheld

THE Just and Hanaman tungsten filament patent and the Langmuir gas-filled lamp patent have again been found valid and infringed, in a decision handed down last week by Circuit Court Judge Julius M. Mayer in the United States District Court for the Southern District of New York. This decision was rendered in a suit for infringement brought by the General Electric Company against Nicholas Fabian, F. Alexander and the Alpha Electric Laboratories, Inc., New York.

Both of these patents in previous litigation had been upheld by the same court and by the United States Circuit Court of Appeals.

Judge Mayer in his decision has tried to make this case final so far as tungsten lamp patent litigation is concerned and delivered his opinion in no uncertain terms, saying:

"The bulk of the record is quite disproportionate to the simplicity of all but one of the questions involved. This extensive record is due in part to the fact that the court felt that the widest opportunity should be given to put forward almost any conceivable fact, experiment or theory directed against validity or infringement, as the case might be, in order that litigation in any event, as to the validity of these patents, should some day come to an end, one way or the other. If, in view of prior litigations, it be ultimately held in this case that the claim of these patents are valid, it is difficult to imagine what new matter can later be brought forth.

"As to the Langmuir patent, there is not a shred of merit to the present attack on validity. The previous case was ably tried for the defense by experienced counsel who did not neglect anything of consequence.

"In no case has fuller opportunity been accorded to a defendant and has more time been allowed to make experiments and prepare defenses, and yet, notwithstanding the ingenuity and ability with which the Just and Hanaman American patent has been attacked, it remains where it was and where it should be—the embodiment of an impregnable invention of the highest order. The court having on other grounds dismissed the bill as to Fabian, plaintiff may have the usual decree with costs against the remaining defendants."

The defense was in validity and non-infringement of the Just and Hanaman patent and non-infringement of the Langmuir patent.

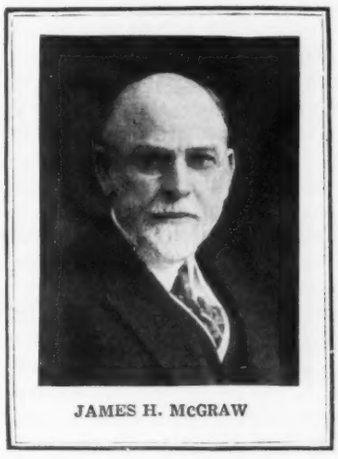
Numerous previous grants of patents were cited to show prior invention, but in no case was the court of the opinion that lamps made under these patents were either practical or by nature of their material worthy of consideration.

The main defense was on the use of a substance called thoria to prevent offsetting of the tungsten filament. This is used to the extent of one-half of 1 per cent by weight and the question arose, therefore, as to "substantially pure tungsten" in a "coherent" and "homogeneous" state. The court held that action of thoria was purely mechanical in strengthening the filaments and did make a composite metal chemically.

Intelligent Work the Cure for Depression, Says James H. McGraw

THAT only by intelligent, untiring work can this country lift itself out of the valley of depression was the message of James H. McGraw, president of the McGraw-Hill Company, last week at the annual convention, in Chicago, of the Associated Business Papers. Mr. McGraw took as his topic "What Business Papers Can Do to Speed the Revival of Business," and after reviewing the general economic situation abroad as well as in the United States he launched into his gospel of work.

"War," he said, "breeds extravagance. In spite of the noble ideals which inspired this nation to take up the great conflict across the seas, the inevitable result was the accumulation of innumerable wastes and habits of extravagance. We became wasteful of our time, our money, materials and even life itself. We could not help it, but we can and we must overcome the habits and tendencies which were developed throughout our entire social and industrial fabric by that terrible conflict. As a tangible example of what can be done, Herbert Hoover has focused the attention of industry upon the unnecessary wastes which are sapping the vitality and reducing the productivity of our nation.



JAMES H. McGRAW

"We are appalled when our attention is called to criminal wastes of life through accidents and negligence, the prodigal waste of our natural resources through underdevelopment or political chicanery, the prodigious waste of materials through mismanagement and inefficiency. But of all the wastes which affect our happiness and prosperity, the waste of time and human effort is the greatest and has the most damaging influence.

"If the business papers collectively and individually can instill into the minds of the thinking men of industry the gospel of intelligent work, we shall have performed a tremendous service.

"In brief, I bring to you as leaders of thought among thinking men that what this country needs more than anything else is to learn anew the gospel of work—intelligent work, untiring work, work in its most homely sense.

"We cannot talk ourselves into prosperity. We cannot argue ourselves into stability, but we can work ourselves out of the valley of depression and up to the heights of plenty. We can do these three things:

"First, everybody can get busy at his present task and make the most of it.

"Second, everybody can consider winning the peace

in the same spirit as characterized the winning of the war.

"Third, the business papers, by article, editorial and personal service, can show that selfishness has now no more place than in war time, that interest in the welfare of all men, individually and as society, lies at the basis of prosperity.

"In conclusion, let me say that we must consecrate ourselves to giving a full measure of the best service we have within us. As a nation and as publishers we must quit our petty quarrels and arguments and devote ourselves to the tasks that lie before us. We had to fight and destroy to win the war. We shall have to work and build to win the peace. The first nation that gets hold of the idea that the only salvation comes from work will come out on top and really win the peace."

At the annual election Mr. McGraw was elected president of the association.

Tax Bill in Muddle Before Senate

THE United States Senate is still grappling with the tax bill and endeavoring to make some headway against the parliamentary tangle into which the measure has fallen. Added to the original House bill is the report of the Senate finance committee, and on top of that are numerous amendments which seem to grow with the passing days. Then there are the various agreements entered into by the "blocs," the most noteworthy of which is the agricultural bloc. Thus far the Senate has not passed on the corporation tax, which is one of the most important parts of the bill. The Senate finance committee would raise this tax 50 per cent above what it is at present.

An agreement was reached early this week on the capital-stock provision, Senator Lenroot's amendment providing a tax of $1 on every $1,000 up to $3,000,000 and $2 on every $1,000 in excess of $3,000,000 having been voted on favorably. The Lodge amendment to the capital-stock provision of the bill was also passed. This amendment exempts holding corporations from paying taxes on property on which taxes had been paid previously by subsidiary corporations of the holding companies.

Senator Smoot has introduced two amendments, one proposing a 1 per cent levy on all manufactured goods where sales exceed $6,000 a year, and another proposing a general turnover tax of one-half of 1 per cent where the sales exceed $6,000. The Senator from Utah had previously offered an amendment providing for a general manufacturer's sales tax of 3 per cent with certain exemptions, among them public utilities, this to be in lieu of all the miscellaneous taxes. His plan also provides for a 10 per cent tax on corporations in place of the 15 per cent tax suggested by the Senate finance committee.

Although the sentiment for a sales tax is growing in the Senate, it is strongly opposed by the agricultural bloc, and its passage by the House for that reason is problematical.

The Lodge amendment, if concurred in by the House, would give some relief to public utility holding companies. All public utilities as well as electric manufacturing companies also gain by the changes in the transportation tax. In the New York district alone this approximates 10 cents a ton on coal, not to mention other supplies and equipment. The utilities, of course, have only an academic interest in surtaxes, because few if any enjoy excess profits. They are, however, vitally interested in the application of these taxes to investors, because with their enforcement capital which should flow to public utilities from large holders of investment funds will be forced more and more into tax-exempt securities. The bill as it now stands in the Senate offers no relief in that respect.

Carolina Company Goes the Limit to Give Service

THE Carolina Power & Light Company at Raleigh, N. C., has begun operation of its steam plant and is now able to furnish power to all of its customers full time. For several weeks about seventy cotton mills and a number of other industrial plants which obtain their power from this company have been able to run only three days a week, the company being unable because of the drought to furnish power for full-time operation. The company had its auxiliary steam plant at Raleigh, but was unable to operate this because the city of Raleigh was also suffering a water shortage and sufficient water could not be obtained for boilers and condensers.

The company, however, decided to put the steam plant in operation and give service at almost any cost. Some wells were sunk, arrangements were made to ship water in tank cars from a creek a few miles away, and consent was obtained from the city to use the reservoir to some extent at night. These methods of keeping the steam plant in operation will be kept up so long as is necessary. Within the past week there have been some general rains over the watershed affected which have helped somewhat. By far the most important step, however, in remedying the situation is the linking up of the transmission lines of the Alabama Power Company with those of the Georgia Railway & Power Company and the exchange of energy through the latter company and the Southern Power Company, as reported in the ELECTRICAL WORLD for Oct. 25, page 890.

Boston Edison Rate Hearings to Be Resumed Dec. 5.

FURTHER developments in the Boston Edison rate case are anticipated Dec. 5, when the Massachusetts Department of Public Utilities will resume sittings at Boston upon the issues brought before it by the city and the company in various petitions previously referred to in the ELECTRICAL WORLD. During the last few weeks representatives of the city have been going over numerous books of the company in the preparation of their petition for reduced rates, but these studies have not yet been sufficiently completed to warrant the presentation of testimony before the board. All the principal classes of service are under consideration, including street and commercial lighting, power and many contracts with large industrial users.

At a hearing on Oct. 31 the company emphasized its desire to have the commission include in the consideration of the case the equity of rates in contracts made before the coal clause was adopted. The tendency of the commission in this inquiry has been to conduct it on very broad lines, but no decision has yet been announced as to its procedure in regard to considering these contracts at the same time with the other issues before the board.

Bankers Sound Note of Caution on Local Stock Selling

STOCK sold locally should represent actual investment and be in line with the market, H. M. Addinsell, chairman of the public service securities committee of the Investment Bankers' Association of America, told the association at its annual convention this week in New Orleans.

"It should be borne in mind," Mr. Addinsell stated in his report, "that in undertaking the sale of its own securities a company assumes certain duties and obligations toward the purchasers of those securities. The purchasers, it must be remembered, are mostly people of comparatively small means who are not accustomed to scrutinizing carefully or judging the merits of investment opportunities. To them the utility company has always seemed a financial pillar of strength. In many cases they have considered it, in spite of published figures to the contrary, a veritable gold mine to its owners. To them, the opportunity to buy this stock is an opportunity to share in profits that they have always considered absolutely certain. A careless or unscrupulous company might, in some cases, sell stock that had no real value behind it. This would be a most dangerous practice. Not only would such a company be running risk of losing the confidence and respect of its local public, but it would be getting back to the same old condition of inflated capitalization which proved so disastrous in the past. It is thus plain that stock which a company expects to market direct should be issued under the same conservative restrictions which would be demanded if the issue were to be made through investment bankers. It should represent actual investment in the property, and the price should be in line with the current quotations for securities of a similar class."

The report stated that the past year of general business depression has accentuated the inherent stability of public utility businesses as a class. It has witnessed a more and more universal adoption of the series-mortgage idea, introducing without disadvantage from the point of view of the investor a flexibility advantageous to the company in availing itself of its principal means of major or mortgage finance. The series mortgage makes available to the company its prime security with a face rate and a maturity to meet existing market conditions. The past year has also been marked, the report continued, by a more general adoption of the "no-par-value" stock plan, which introduces a similar flexibility with respect to the sale of junior securities.

Commission regulation, it was pointed out, is steadily becoming more firmly established as a permanent institution. The matter of the basis for valuation of public utilities was said to be unsatisfactory and is one that is being studied by a sub-committee and will be the subject of an interim report later on.

WATER POWER REGULATIONS

With respect to the development of water-power resources under the national water-power act the report states that the regulations now in effect have been under discussion by the leading men of the water-power industry and in many particulars are not yet satisfactory and workable, especially with reference to the accounting rules and the basis for determining when amortization of investment begins. The present regulations require that amortization of capital shall commence when the rate of return on the property has reached one and one-half times the weighted average true interest rate upon the company's indebtedness. A more logical basis, it is stated, would seem to be to have amortization start after earnings equal a certain reasonable and proper percentage of the value of the entire property.

"Many other problems," the report stated, "are constantly coming up for solution. With the readjustment of commodity prices has come a temporary lowering of costs of labor and essential materials, but it is as yet by no means certain that this is not a mere temporary condition so far as the utility business is concerned. It is, therefore, necessary to these utilities that they be allowed to maintain their present rates to cover previous losses in operation and to re-establish a credit for the carrying on of the large construction program which has been deferred for the past four years."

Digest of Proposed California Bill for State Power Control

STATE control and operation of electric power and water plants is, as has been reported before, proposed for California, and the plan will in all probability be placed before the voters of that state at the election in November, 1922. The bill as proposed creates a board of five, members of which are subject to recall. The term of office is four years.

The powers of the board, which are very broad, are:

(a) To acquire by purchase, lease, condemnation, gift or other legal means land, water, water rights, easements, electric energy and any other property necessary or convenient for the purposes of this article, and likewise to acquire and also to construct, complete and operate, works, dams, reservoirs, canals, pipe lines, conduits, power houses, transmission lines, structures, roads, railroads, machinery and equipment, and to do any and all things necessary or convenient for the conservation, development, storage and distribution of water and the generation, transmission and distribution of electric energy. No electric energy shall be purchased by the board at a price to exceed one-half of 1 cent per kilowatt-hour at the power plant, based upon a 50 per cent load factor, except for standby service as provided in Section 12 hereof;

(b) To purchase, acquire, produce, manufacture or otherwise provide facilities, materials and supplies, raw or finished, and any property or thing necessary or convenient to the accomplishment of the purposes of this article;

(c) To supply water or electric energy or both to the state, political subdivisions and other users, and, subject to the provisoins of this article, to prescribe the terms of contracts, and fix the price thereon and collect the same;

(d) To use the waters and the lands of the state, or any material therein or thereon, and to require the reservation from sale or other disposition of such lands and material as, in the opinion of the board, will be required for the purposes of this article;

(e) To require the reservation of water from appropriation for such periods as it may provide;

(f) In the name of the state to apply for and accept, under the provisions of the laws of the United States or of any state, grants, permits, licenses and privileges in the opinion of the board necessary for the accomplishment of the purposes of this article;

(g) To co-operate and contract with political subdivisions of this state, and, with the approval of the Governor, with the United States and other states, concerning the conservation and use of interstate and other waters and the generation and use of electric energy and the acquisition, construction, completion, maintenance and operation of works necessary or convenient for the accomplishment of the purposes of this article;

(h) To acquire or construct for political subdivisions

distributing systems for water or electric energy bought from the state, upon terms that, in the opinion of the board, will repay to the state within twenty-five years the cost thereof with interest. The title to or interest of the state in such systems shall vest in the political subdivision when paid for;

(i) To sue and be sued, and to exercise in the name of the state the power of eminent domain for the purpose of acquiring any property, or the use or joint use of any property, deemed by the board necessary for the purposes of this article;

(j) To provide itself with suitable office and field facilities, and to appoint, define the duties and fix the compensation of such expert and technical officers, legal and clerical assistants and other employees as it may require, subject to such civil service regulations as the board may provide;

(k) To define projects and to adopt rules and regulations to govern its activities;

(l) To exercise all powers needful for the accomplishments of the purposes of this article and such additional powers as may be granted by the Legislature.

State bonds in amount not exceeding $500,000,000 may be issued in order to acquire property and rights and "for the acquisition, construction development, completion, operation and maintenance of such projects. as the board may deem necessary or convenient. . . ."

The board, it is proposed, shall establish rates for the service furnished by each project sufficient to pay, within fifty years, its cost and operating expenses except for municipal systems where the time shall be twenty-five years.

If revenues are not sufficient to meet requirements, then the board may draw upon the general treasury of the state to meet any deficiencies. It is provided, however, that such loans by the state are to be returned as soon as the money is available. Six per cent interest is to be charged.

The bill gives to state and political subdivisions "a preferred right to water and electric energy controlled by the board as against privately owned public utilities." Furthermore "the board shall not supply water to a privately owned public utility for the production of electric energy and shall not supply directly or indirectly to privately owned public utilities which sell electric energy or water to the public more than 20 per cent of the total amount of electric energy or water under its control, and contracts therefore shall not extend over a longer period than five years, or be renewed before one year prior to their expiration."

The bill also assures political subdivisions that they may co-operate with each other in developing water power.

Governor Allen to Address Engineers on St. Lawrence Development

ON MONDAY, Nov. 14, the New York Section, American Institute of Electrical Engineers, will join the metropolitan sections of the civil, mechanical and mining engineers in a discussion of the St. Lawrence River ship canal and power project at 8 p.m. at the Engineering Societies Building. The speakers will be Gov. Henry J. Allen of Kansas, who will represent the views of Middle West producers; Gov. W. L. Harding of Iowa; Dr. R. S. MacElwee of Georgetown University, who will speak on the economic features of the project, and H. I. Harriman of Boston, on the Eastern point of view.

The three hundred and seventy-second meeting of the Institute will be held at the same place on Thursday, Nov. 17, in joint session with the Society of Naval Architects and Marine Engineers. At 2 p.m. these two papers will be presented: "Electric Auxiliaries on Merchant Ships," by E. D. Dickinson, marine department, General Electric Company, and "Electric Propulsion," by W. E. Thau, commercial engineer for the Westinghouse Electric & Manufacturing Company. There will also be an evening session of the Institute at 8.15 o'clock, which members of the Society of Naval Architects and Marine Engineers and all others interested are invited to attend. This session will be devoted to a lecture on "World Communication," by Alfred N. Goldsmith, professor of electrical engineering, College of the City of New York.

October Financing at Much Lower Rates

STOCKS and bonds amounting to $30,254,000 were offered investors by electric light and power public utilities during the month of October, a total representing a decrease of more than $10,000,000 under that of the previous month. The month of October showed a marked decline in the rate of return yielded the investor, 7.33 as compared with 7.6 for the month of August. The month's flotation is characterized by lower rates of interest and again by long-term investments, the periods running from five to fifty years. The largest single issue was $160,000,000 for the Philadelphia Company.

Name of Company	Amount of Issue	Period	Class of Security	Purpose of Issue	Rate of Interest	Per Cent Yield	Price
Ohio Public Service Co.	$5,100,000	25-yr.	First mortgage and refunding gold bonds, series A	Retirement of bonds	7½	7.75	97½
San Joaquin Light & Power Co.	1,500,000	30-yr.	Unifying and refunding mortgage bonds	Refund floating debt	7	7	100
Philadelphia Co.	16,000,000	25-yr.	First refunding and collateral trust mortgage gold bonds, series A		6	7.15	87
Los Angeles Gas & Electric Corp.	1,500,000	9¼ yr.	General and refunding mortgage gold bonds, series C	To provide for additions	7	7.12	99
New Jersey Power & Light Co.	361,000	15-yr.	First mortgage bonds, series of 1916	Reimbursement for expenditures for additions and betterments	5	7.75	76.30
Seneca Power Co.	325,000	50-yr.	General mortgage gold bonds		6		Par
Central Illinois Light Co.	1,053,000	30-yr.	First and refunding mortgage gold bonds	Reimbursement for expenditures	7½	7.65	98½
Savannah Electric & Power Co.	1,750,000	20-yr.	First and refunding mortgage bonds, series A	To retire balance of floating debt	7½	7.75	97½
Counties Gas & Electric Co.	1,080,000		Class A, cumulative preferred stock	To reduce floating debt	8		Par
Louisville Gas & Electric Co.	500,000	5-yr.	First and refunding mortgage gold bonds of 1918		7	7.20	99¼
Rockland Light & Power Co. (New York)	500,000	5-yr.	Convertible gold bonds	To provide funds to pay outstanding obligations	7	8.25	94.96
Wisconsin-Minnesota Light & Power Co.	235,000	30-yr.	First and refunding mortgage gold bonds of 1914		5	5	100
Crookston Water Works Power & Light Co., (Minnesota)	200,000	15-yr.	First mortgage gold bonds	To retire bonds	7½	7.50	100
New Bedford Gas & Edison Light Co.	150,000		Capital stock				
Total	$30,254,000						

Current News and Notes

Timely items on electrical happenings throughout the world, together with brief notes of general interest.

Mexican Hydro-Electric Plant May Be Extended.—The Canadian Power Company, which has spent $11,000,000 in constructing its dam and hydro-electric plant on the Conchas River at Boquillas, Mexico, is reported to be planning the extension of its system to a number of towns and mining plants in addition to those it already serves. The state and national governments are said to be contemplating a system of canals and ditches which would make possible the irrigation from the company's storage reservoir of 200,000 acres of arable land.

Oklahoma's Utilities to Pay Millions in Taxes.—Public service companies of Oklahoma will, it is estimated, pay taxes on a valuation of approximately $308,000,000 for 1921, the total valuation of these corporations having been increased at least $10,000,000 over last year. This is represented largely by improvements which have not only added millions to the taxable wealth of the state, but have brought about a great improvement in service to the public. It is estimated that the utility companies will pay $9,000,000 in ad valorem taxes to the state, county and municipal governments, to say nothing of what they will pay in gross production and federal income taxes.

Record in Restoring Service for Wrecked Substation.—The Barrington substation of the Public Service Company of Northern Illinois, serving nine towns, was destroyed and the station operator on duty lost his life when the substation was struck by lightning a few weeks ago. The lightning stroke was followed by an explosion that utterly wrecked the building. A record was made in restoring the service, the large crew that was quickly assembled having the new outdoor station in operation in thirty-five hours and thirty-five minutes after the accident occurred. The cause of the explosion has not been ascertained, though an investigation is being made to determine it.

Electioneering by Radio.—For the first time in the history of electioneering voters were able to listen to the speeches of candidates without leaving their homes when arrangements were made in Pittsburgh by the Westinghouse Electric & Manufacturing Company to send the speeches broadcast by radio in the recent contest for the mayoralty. Thousands of persons were addressed at one time without the inconvenience of leaving their own radio set. Each candidate for mayor was sent to the broadcasting station, where he was allowed five minutes to tell the reasons why he should be elected to the office. The novel method of electioneering excited a great deal of interest in Pittsburgh and neighboring towns.

Electricity in the Welsh Collieries.—A million pounds will, it is said, be expended by a Welsh company in extending the use of electricity to the mines under its control. A new power house at Bargoad, which represents the latest practice, is to be enlarged to permit the installation of generators rated at 30,000 kw., making it the largest private undertaking in the country. This station will supply energy to the company's pits in various sections and will substitute electrical for steam operation wherever possible.

Kansas City's New Lighting System.—Two thousand gas posts will be displaced when the new all-electric lighting system of Kansas City, Mo., is installed by the Kansas City Power & Light Company. Electric lamps of the pendent and cluster types will go, too, and a new system utilizing "Novalux" units will take their place. About 7,000 of these lamps have already been contracted for, and it is possible that as many more will be used before the system is pronounced complete. Gas, which has hitherto been employed to illuminate the residential districts, will be entirely discontinued for street-lighting purposes, and greatly improved designs of posts and globes will succeed the ones to be discarded. The improvements are expected to put Kansas City in the front rank of the big cities of the country, as regards night-time safety and brilliancy.

"Home Electrical" Opened in Northwest.—The first "home electrical" in the Northwest was opened in Astoria, Ore., Oct. 15, under the auspices of the Northwest Electrical Service League. The demonstration, which lasted for three days, was designed to show the practicability of equipping a home electrically throughout and the necessity of providing adequate convenience outlets. The house used, a bungalow, was completely furnished by Astoria merchants and the electrical equipment was supplied by Portland jobbers. The demonstration was arranged for by W. D. Moriarity, field man for the Northwest Electrical Service League, and conducted under his supervision. The attendance was very large, and the exhibition was thoroughly successful from every standpoint. It is planned to hold other demonstrations throughout the Northwest during the coming year.

Electric Cargo Ship on Maiden Trip Arrives in New York.—The San Benito, the largest foreign built electric drive cargo steamer to enter New York, arrived on her maiden voyage recently from Almeria, Spain. She reported a successful passage through hurricane weather which tested her efficiency and seaworthiness to the utmost. The ship is of 5,500 tons gross burden, 336 ft. long and has a beam of 45 ft. She is equipped with a Curtis turbine generator and a 3,000-hp. synchronous motor connected directly with the propeller. The motor is set far astern, thus eliminating the long shaft and shaft tunnel and giving additional cargo space. The San Benito was designed for a speed of 12 3-5 knots and on her first voyage made a minimum of 10 1-2 knots and a maximum of 15 1-10 knots. Officials said that despite the heavy weather the propellers did not spin when the stern left the water. This was said to be due to the action of a governing device on the electric drive.

Associations and Societies

A complete Directory of Electrical Associations is printed in the first issue of each month.

Electrical Manufacturers' Club.—The Electrical Manufacturers' Club will hold its annual meeting at Hot Springs, Va., on Wednesday to Saturday, Nov. 9-12.

Pacific Division, Electrical Supply Jobbers' Association.—The quarterly meeting of the Pacific Division of the Electrical Supply Jobbers' Association will meet at Del Monte, Cal., on Nov. 10, 11 and 12.

Milwaukee Section, A. I. E. E.—Prof. John R. Commons, professor of economics at the University of Wisconsin, addressed the Milwaukee Section of the Institute on Oct. 19 on the labor and employment situation.

A. I. and S. E. E. October Meetings.—Automatic substations were discussed before the Chicago Section of the Association of Iron and Steel Electrical Engineers on Oct. 31 by Charles H. Jones. On Oct. 24 the Pittsburgh Section discussed the papers presented at the annual convention.

American Physical Society.—The one hundred and eleventh regular meeting of the American Physical Society will be held in Chicago at the Ryerson Physical Laboratory on Saturday, Nov. 26. If the length of the session shall require it, there will also be sessions on Friday, Nov. 25.

Boston Section, A. I. E. E.—Dr. H. S. Osborne of the American Telephone & Telegraph Company spoke at the Oct. 28 meeting of this section on "Telephone Transmission Between Cuba and Catalina." The meetings and papers committee of the section has arranged a very interesting program for the winter. The dates are not yet definitely fixed, but the meetings will cover the St. Lawrence project, recent details upon radio communication, some of the recent developments in electrical drive for industrial plants and kindred subjects. Joint meetings with the other engineering societies are being arranged for, as was done last year.

Coming Meetings of Electrical and Other Technical Societies

A. I. and S. E. E., Philadelphia Section—Philadelphia, Nov. 5.
Electrical Manufacturers' Club — Hot Springs, Va., Nov. 9-12.
A. I. E. E., New York Section—Nov. 14.
N. E. L. A., Pacific Coast Section—Del Monte, Cal, Nov. 11.
Electric Power Club—Cleveland, Nov. 14-15.
A. I. E. E. and Society of Naval Architects and Marine Engineers — New York, Nov. 17.
American Physical Society—Chicago, Nov. 25-26.
Electrical Supply Jobbers' Association—Pacific Division—Del Monte, Cal., Nov. 10-12. Atlantic Division —Cleveland Nov. 30, Dec. 1-2.
American Institute of Chemical Engineers —Baltimore, Dec. 6-9.
American Physical Society—Toronto, Canada, Dec. 27-31.
American Association for the Advancement of Science—Toronto, Canada, Dec. 27-, 31.

Recent Court Decisions

Findings of higher courts in legal cases involving electric light, power and other public utility companies

Service Charge Is Not a Rental Charge for Meters.—That a service charge is not a rental charge for gas meters within the meaning of the statute prohibiting such a charge was the finding of the New York Supreme Court, Special Term, in an action recently brought by the Town of North Hempstead against the Public Service Corporation of Long Island.

Change of Municipal Rules Affecting Signs Not Valid as to Existing Signs Properly Erected.—A new municipal ordinance affecting the size and erection of electric signs has been declared by the Supreme Court of Oregon (City of Portland vs. Yates) to be invalid as regards previously existing signs safely installed in accordance with the former rules of the city, no question of public health, morals or welfare being involved. (199 Pac. 184.)*

Commission May Not Interfere with Alienation of Property of Public Service Corporation Not Essential to Its Duties.—The Supreme Court of Alabama has declared, in Alabama Public Service Commission vs. Louisville & Nashville Railroad Company, that the common-law rule that a quasi public corporation may not, in the absence of statutory warrant, make any contract by which its power to perform its public functions will be impaired never did prevent the alienation of such property as was not essential to the exercise of its duties, and hence the commission was not authorized to determine whether or not an alienation of such property was consistent with the interest of the public. (89 So. 524.)

Increase of Rates Without Full Hearing.—In decreeing that the New York Public Service Commission has power to authorize increased telephone rates where existing rates appear unreasonable, even though a full hearing and investigation have not been had, the New York Supreme Court said (New York vs. New York Telephone Company): "The Legislature has given the Public Service Commission the power not only to make orders fixing the maximum rates, but to abrogate such orders and to 'consent' to an increase of rates. It would be unreasonable to hold, without a clear expression by the Legislature, that when the commission is of the opinion that conditions have changed to an extent which renders the old rate unreasonable and perhaps unconstitutional, it must continue its old order in force and may not 'consent' to an increase of rates pending the time when it can, after a full hearing, make a new 'prophecy' as to what will constitute reasonable rates in the future." (189 N. Y. S. 701.)

*The left-hand numbers refer to the volume and the right-hand numbers to the page of the National Reporter System.

Notice of Bonus to Employees Does Not Affect Right to Discharge.—A notice by an employer that salaried employees remaining with the company during the year would receive a bonus dos not, according to the decision of the California District Court of Appeals, in Russell vs. H. W. Johns-Manville Company of California, affect the employer's right to discharge an employee hired from month to month at any time before the expiration of the year, the bonus being a voluntary gratuity and not binding. (200 Pac. 668.)

Where Does "Delivery" of Electricity Take Place?—Where an electric light and power company was bound by its franchise to pay a percentage of its receipts on all electrical energy sold within the city limits, the city cannot, according to a decision of the Supreme Court of California in City of Oakland vs. Great Western Power Company, collect for energy delivered to a corporation outside the city limits, even if the makers are within the limits, since "delivery" takes place at the junction of the wires of the customer and of the wires of the selling company, and not at the meter. Nor does the fact that a customer outside the city limits redelivered electrical energy for use within the city limits authorize the city to collect a percentage on the energy so delivered. (200 Pac. 395.)

Control of Franchise Contract Rates.—In an action begun by the town of North Hempstead, N. Y., to enjoin the Public Service Corporation of Long Island from increasing rates charged for gas to private consumers over those fixed by consent, which had been granted subsequent to the enactment of the Public Service Commissions law, the Supreme Court of New York, Special Term, denied the plaintiff's motion to continue a peremptory injunction. Thereafter, the Appellate Division, Second Department, reversed the order of the Supreme Court, Special Term. The Court of Appeals has now reversed the Appellate Division and affirmed the order of the Special Term vacating the temporary injunction. The court holds that the consent given by the town is subject to the rights reserved to the company by the Public Service Commissions law to put into operation a new schedule on giving the prescribed notice. (132 N. E. 144.)

What Constitutes an Electric Light Company?—In Commonwealth vs. Pennsylvania Water & Power Company, the defendant, a hydro-electric company which had been formed by a consolidation of water-power companies, contended that it was not an electric light company. The state had endeavored to assess against it a gross income state tax on amounts received from the sale of electrical energy. Neither the defendant nor any of its constituent companies was chartered as an electric light company or engaged in electric lighting, but a part of the energy sold by it is ultimately used for that purpose. In 1916 taxes were assessed against the company upon its gross income from the sale of electrical energy on the theory that its business was that of an electric light company. The County Court found against this contention, and the finding has now been sustained by the Supreme Court of the state. (114 At. 489.)

Commission Rulings

Important decisions of various state bodies involving or affecting electric light and power utilities

Clerk's Error Binding on Commission.—The North Dakota Board of Railroad Commissioners has held that a schedule of rates which owing to the oversight of a member of its clerical force was not placed before it within the legal period of thirty days from the time of filing became the legal schedule and cannot now be suspended in order to allow a hearing.

Interrelation of Good Service and Adequate Rates.—The principle that, although increased rates should not be granted to a company while its service is below minimum standard, just as soon as its service is improved an advance in rates should be accorded it in order that it may attract capital by assuring safety of investment and continuity of return was sanctioned by the North Carolina Corporation Commission in deciding an application for increased gas rates made by the Asheville Power & Light Company.

Cities Have Right to Appear Against Applications by Utilities.—The right of cities and villages in New York State to appear in opposition to applications made to the Public Service Commission by utility companies affecting municipal contracts has been affirmed by the commission. This right had been disputed on the ground that municipalities had no legal status. The commission held differently and said: "The theory of the whole thing is that a contract is a contract, and we are here to sustain the contract unless certain circumstances are made to appear to us to show that the contract should be for the time being done away with or suspended."

Coal Rider Retained as Precautionary Measure.—In refusing increased rates to the street-railway and electric departments of the Lynchburg Traction & Light Company while granting them to the gas department, the Virginia State Corporation Commission maintained that the water-power facilities of the city should rightly inure to the benefit of electrical customers. Concerning the retention of a coal rider it said: "It is, of course, desirable to minimize the operations of the coal rider as much as possible, so that the customer may more nearly apprehend what the cost of his energy will be. Since, however, we are granting no increase in electric rates and it is given to no one to prophesy as to the future, we judge it best to continue the coal rider for the present, so that the company may be saved from disaster in the event that there is another such extraordinary increase in coal prices as that of the fall of 1920, and on the other hand so that the customers may have the benefit of any saving the company may be able to effect in the price of coal or in the freight charges upon it."

Men of the Industry

Changes in Personnel—Responsibilities and Association Appointments of Men Engaged in Professional, Executive, Operating and Commercial Branches of the Industry

D. A. Cheney, who was elected president of the Southeastern Section of the National Electric Light Association at its meeting in Chattanooga, Tenn., Oct. 17-19, is general manager of the Orlando (Fla.) Water & Light Company. Mr. Cheney was born in Orlando Jan. 23, 1889, and educated in the local schools and Rollins College Academy, Winter Park, Fla. He was graduated with the degree of A.B. from Dartmouth in the class of 1911. Mr. Cheney was first employed by the Orlando Water & Light Company as an engineer in the generating station. After his graduation, however, he was identified with the business office, serving successively as cashier, bookkeeper, assistant manager and general manager. The latter position he has held since 1915. The Orlando Water & Light Company serves the cities of Orlando, Winter Park and Maitland with electric service and also operates rural service lines. The company operates in addition waterworks, gas and ice plants in Orlando. It serves 15,000 people in a fast-growing section. The company was organized as the Orlando Water & Sewage Company in 1887. In 1894, when it went into the hands of a receiver, it was taken over by Judge J. M. Cheney, father of D. A. Cheney, United States district attorney and United States district judge, who has developed the property to the present time. In 1901 the electric plant was installed, in 1903 the ice plant was added, and in 1905 the local gas works were absorbed and the three were consolidated under one organization bearing the present name. Mr. Cheney has been associated with the Southeastern Section of the N. E. L. A. for a number of years and has served as a member of the executive committee and as second and first vice-president.

D. A. CHENEY

T. O. Kennedy, who was recently elected president of the Rocky Mountain Division of the N. E. L. A., has been general superintendent of the Denver Gas & Electric Light Company since the summer of 1917. Mr. Kennedy has been very active in arousing public appreciation of electrical service. He is chairman of the committee on public utility information in the Rocky Mountain territory and also of the advisory committee of the Denver Co-operative Electric League, and, in fact, credit is given to him as the first to see the possibilities of such co-operative development. He is also head of the league's committee in the building of Denver's first electrical home. In addition, he was at one time chairman of the electrical bureau of the Denver Civic & Commercial Association. Mr. Kennedy was born Nov. 26, 1886, at Poplar Bluff, Mo., and was educated in the public schools of that place, later attending the University of Missouri, where he was graduated as an electrical engineer in 1907. He then started as a junior engineer with the old Denver Gas & Electric Company and in September, 1908, was transferred to the Montgomery (Ala.) Light & Water Company. He returned north in September, 1910, to become superintendent of the Lincoln (Neb.) Gas & Electric Company, and remained there until January, 1912, when he was appointed engineer in charge of the Ozark Power & Water Development on the White River in Missouri. The New York office of Henry L. Doherty & Company was his next place of service, as construction engineer for the company, and in August, 1914, he became general manager of the Massillon (Ohio) Gas & Electric Company. In July, 1917, the Doherty company made some changes in its Denver personnel, with the result that Mr. Kennedy was transferred to that city and made general superintendent. Arriving there during the war, he immediately engaged in Liberty loan and welfare agency drives, heading unusually successful teams in every case.

T. O. KENNEDY

John K. Swanson, the recently elected president of the Michigan Section of the National Electric Light Association, is a native of Scotland. He came to America in 1889 and resided in New York City until 1900, when he removed to Michigan. He is a graduate of Albion College and first entered business life as a salesman for the Saginaw Milling Company. He entered the utility field with the Saginaw Gas & Electric Company in 1913 and became the general manager of the Bay City Gas & Electric Company a year later. In 1916 he was transferred to the Jackson office and became secretary of the Michigan Light Company and assistant secretary of the Consumers' Power Company. In 1919 he was made district manager of the Michigan Light & Consumers' Power Company with headquarters in Jackson. This position he now holds. Mr. Swanson has been a strong supporter of the National Electric Light Association work and a consistent "booster" in the state association work of which he now becomes the leader.

J. K. SWANSON

D. W. Roper was the subject of a biographical sketch in the Oct. 8 issue of the ELECTRICAL WORLD owing to his appointment as chairman of the underground systems committee of the N. E. L. A. Unfortunately the section originally prepared recording results of Mr. Roper's special engineering investigations was accidentally omitted in making up the page. That section is as follows:

Mr. Roper is a member of the Western Society of Engineers and has taken an active part in developing that organ-

ization as well as the local section of the Institute. He has contributed many important papers to the A. I. E. E. on underground cable work and two papers, one in 1915 and the other in 1920, on lightning protection for distribution circuits. His paper on "Experience with Line Transformers," presented before the A. I. E. E. on May 28, 1914, preceded his investigations on lightning protection. He also presented a noteworthy paper on electrolysis before the St. Louis Section of the A. I. E. E. on May 29, 1918. Another paper was presented before the Edison Illuminating Companies on underground work in 1906. He has also served on several committees of that association. For a paper on "A Few Unusual Burn-outs of Underground Cables," presented in 1908 before the Western Society of Engineers, Mr. Roper received the award of the Chanute medal.

William W. Merrill, the new chairman of the Switch Box Section of the

W. W. MERRILL

Associated Manufacturers of Electrical Supplies, is the vice-president and general manager of the Chicago Fuse Manufacturing Company. He has come up through the ranks in that organization since 1894, having served successively as bookkeeper, cashier, secretary, assistant treasurer, treasurer, and since April, 1910, as vice-president and general manager.

His education was received in the Boston schools and he went to work for the Boston & Maine Railroad in 1889. He remained with that company until 1892, when he went to Chicago and entered the statistical department of the Illinois Steel Company. He was later transferred to the auditing department, remaining there until he went to the Chicago Fuse Manufacturing Company in 1894. Mr. Merrill has made his way up through hard work and knowledge of the business in building up the company so that at present he is the second largest stockholder.

Edward Flad has resigned as a member of the Missouri Public Service Commission to resume the practice of civil engineering in St. Louis.

C. V. Allen has been appointed Mexican manager of the Westinghouse Electric International Company with headquarters at Mexico City.

C. O. Wilson, formerly merchandising manager for the Adirondack Power & Light Corporation, has become resident manager for the company at Oneida, N. Y.

A. Telford Smith has become associated with the São Paulo (Brazil) Electric Company, Ltd. Mr. Smith was formerly with the Winnipeg (Man.) Electric Railway Company.

Ward B. Kindy has left the Iowa State College, where he was instructor in the electrical engineering department, to take up similar work in the Leland Stanford, Jr., University.

William C. Murrell has become associated with the Public Service Electric Company, Newark, N. J. Mr. Murrell was formerly an instructor in Cornell University.

W. Harry Stone, who was superintendent of electrical construction with the Los Angeles Railway for many years, has resigned and entered into business in Los Angeles.

R. P. Harrison of the Thomas & Betts Company, New York City, has recently been appointed chairman of the Outlet Box and Outlet Box Fittings Sections of the Associated Manufacturers of Electrical Supplies.

Earl Browne, the newly elected president of the California Contractor-Dealers' Association, has been identified with the activities of the contractor-dealers of San Francisco since 1907. In that year he joined the Electric Appliance Company, where he was employed for two years. Subsequently he was with the Dunham, Corrigan & Hayden Company and the John G. Sutton Company. Two years ago he organized the firm of Browne-Langlais, electrical contractors. In 1917 he was president of the San Francisco Association of Contractor-Dealers.

Harry W. Eastwood, who for the last four years has had charge of the steel mill and crane division of the Cutler-Hammer Manufacturing Company, has been appointed manager of the Cleveland branch office, taking the place of Lynn B. Timmerman, former assistant manager of the central district, who leaves to enter the automobile business in Lima, Ohio, after having been associated with the Cutler-Hammer Company at Cleveland since 1914. Mr. Eastwood's experience in the electrical industry, particularly in the controller field, dates back from his graduation from Rose Polytechnic Institute in 1906 with degrees in engineering. He was first associated with the Ohio Works of the Carnegie Steel Works at Youngstown and later with the Electrical Controller & Manufacturing Company of Cleveland, in association with his brother, A. C. Eastwood, who was one of the early organizers of the Cleveland company. Mr. Eastwood's association with the Cutler-Hammer Manufacturing Company began in August, 1917.

Charles L. Shedd has been appointed manager of the Detroit office of the American Bosch Magneto Corporation, taking the place of Roy Davey, who has been made manager of the manufacturing sales department at Springfield, Mass. Mr. Shedd was at one time promotion manager of the truck division of the Packard Motor Car Company at Detroit. Subsequently he served as official distributer at Omaha for that company, and still more recently he acted as sales manager of the Republic Truck Corporation in New York City.

E. Newnham, for the past eleven years connected with the Robbins & Myers Company, Springfield, Ohio, in the capacity of electrical engineer and motor-sales manager, is now financially interested and actively connected with the H. G. Manufacturing Company,

E. NEWNHAM

St. Louis, manufacturer of fractional-horsepower motors. Mr. Newnham will be active in both production and sales.

Obituary

Herbert F. Flagg, supervisor of maintenance for the Central Massachusetts Electric Company, Brookfield and Warren districts, was accidentally killed at Brookfield Oct. 15 by the failure of a pole upon which he was working. He was born at Winchendon, Mass., about thirty-one years ago.

James A. Anderson, district manager of the Minneapolis and St. Paul offices of the Wagner Electric Company, with charge of the company's business in Minnesota and North and South Dakota, died recently in Minneapolis after a long illness. He had been connected with the electrical industry in Schenectady, N. Y., and New Orleans.

Trade and Market Conditions

Business Reviews, Together with Market Letters from Important Trade Centers, on the Supply, Demand and Prevailing Prices of Electrical Apparatus and Supplies

Some Improvement in Porcelain Insulator Market

A SURVEY of the market for porcelain insulators shows that some improvement has been experienced since last summer, but that something in the nature of a dead level may be expected until around the first of the year. Demand for the small distribution sizes of porcelain insulators is fairly good in the East and South, and indications are that a number of jobbers have let their stocks run low. Rush orders have been received by manufacturers from jobbers in Boston and in various parts of Pennsylvania, though none of these orders has been particularly large. A number of fair orders have been received from the Southeast and the South. Jobbers in other parts of the country seem fairly well stocked.

Reports from the Middle West say that jobbers are well stocked and can make immediate shipments for all ordinary demands. There are numerous inquiries and a fair number of orders, most of them for small lots. Utilities there are not buying as heavily as was the case several months ago. This condition may be accounted for by the fact that the number of small extensions under construction has dropped off.

Prices remain unchanged since the drop which was made around the beginning of September. Manufacturers say that labor costs are still high and that there is not apt to be another decrease for some time.

Unemployment Conference Sees Hope in Building Improvement

IT IS well to note that the National Conference on Unemployment is depending to a great extent on construction work to reduce the number of men out of work at the present time and to help the country over the hard winter season that has been predicted. Basing the program on the tremendous total of contracts let during September, which exceeded the largest previous September by 11½ per cent, Secretary Hoover is keeping in touch with mayors' committees all over the country to speed up the construction of public works and public utilities. The public works committee of the conference is co-ordinating all this information and making it available for any community that wishes it.

This step is important not only to the individual who is out of work but to the contractor-dealer who has been expecting to "lay off" the greater part of his organization this winter and to the manufacturers of wire, fixtures, schedule material and, in general, all wiring supplies. Ordinarily public works construction is allowed to drag along slowly, but if the Unemployment Conference succeeds in its program it will mean that a good percentage of the public works and buildings which had been scheduled to start next spring will get under way at once. At the present time there is planned about $800,000,000 worth of this kind of construction which is not contracted for. If one-half of this could be started now, it would mean at least $20,000,000 worth of electrical work, figured on the basis of 5 per cent of the total building cost.

It is felt by the building industry that the standing committee of the conference will prove of great value to business interests of the country later as well as now. Studies carried on, according to officials, will be designed to prevent sharp variations in the country's employment curve over a period of years by suggesting methods of spreading work opportunity over the lean and the fat years. What this would mean to every branch of the electrical industry may easily be seen.

Malleable Fittings Prices Unsteady in Dull Market

AS IN the other branches of the iron and steel industry the manufacturers of malleable fittings are operating only on part time and quite a wide range in price quotations can be had. One New England foundry which turns out guy clamps, insulator pins, washing machine parts and other miscellaneous small castings is operating from two to three days a week. Very few large orders are being placed and competition is keen. Price cutting is much in evidence and some manufacturers declare that prices have been quoted in a number of instances which cover only the bare cost of material and labor without any allowance for overhead cost or profit.

From the high mark two years ago of 36 cents a pound for small malleable castings the price has dropped to around 13 to 14 cents a pound at the present time. Some quotations as low as 8 to 10 cents have been reported. For the larger castings the price ranges from 8 to 11 cents per pound. Malleable prices at Pittsburgh have held steady around $20.50 per ton for the past month. However, slight changes would have little effect on finished castings and there is little to indicate that finished prices will change for some time.

Manufacturers state that many users of malleable castings have large stocks on hand which were purchased a year or so ago and these stocks must be consumed before any considerable activity can be expected.

Metal Market Situation

THE copper market has shown some strength during the week, though some producers are reported to have made sales early in the week at slightly under 13 cents. However, there was little of this, and the large producers have not weakened in their stand for a 13-cent price. There is not a great deal of activity in the market at this price, though domestic consumers seem slightly more interested than before in covering their requirements for the year. Domestic consumption for October was estimated at 60,000,000 lb., which is about 40 per cent under September. Exports for October also apparently will be smaller, though government figures are not yet available.

NEW YORK METAL MARKET PRICES

	Oct. 24, 1921	Oct. 31, 1921
Copper	£ s d	£ s d
London, standard spot	66 2 6	66 5 0
	Cents per Pound	Cents per Pound
Prime Lake	13 00	13 00
Electrolytic	12 75	12 75
Casting	12 37½	12 37½
Wire base	14 50	14 50
Lead, Am. S. & R. Co. price	4 70	4 70
Antimony	4 85	4 80
Nickel, ingot	41 00	41 00
Sheet zinc, f. o. b. smelter	10 00	10 00
Zinc, spot	5 10—5 15	5 05—5 10
Tin, Straits	28 50	28 12½
Aluminum, 98 to 99 per cent	24 50	24 50

OLD METALS

	Cents per Pound	Cents per Pound
Heavy copper and wire	10 50 —11 00	10 50 —10 75
Brass, heavy	5 00 — 5 50	5 00 — 5 25
Brass, light	4 75 — 5 00	4 75 — 4 87½
Lead, heavy	3 75 — 4 00	3 75 — 4 00
Zinc, old scrap	2 25 — 2 37½	2 25 — 2 50

THE WEEK
IN TRADE

Prices When Quoted Are Those Prevailing at the Opening of Business on Monday of This Week for Points West of the Mississippi River and on Tuesday for All Eastern Points

CHANGES in the electrical industry of any consequence are hard to find. The tone of business in all parts of the country still is one of very gradual improvement with very few high spots. There is little or no pessimism and there seems to be confidence that any improvement which occurs from now on is bound to be permanent.

Chicago reports a fair movement of electrical supplies, with virtually no price changes. Contractor-dealers are optimistic there on account of suburban residence building. Manufacturers of arc-welding apparatus report good sales for reclamation purposes. New York jobbing houses are experiencing a good call for wiring supplies. A reduction of 10 per cent on knife switches has been announced. Building operations in Atlanta to Nov. 1 have exceeded the amount for the whole of 1920. Drought is being felt there and power customers are being rationed by the Carolina Light & Power Company. Conditions in the New England textile district have greatly improved, some mills operating on a full-time basis. Boston jobbers have low stocks and are starting to order from manufacturers. The same condition is reported from St. Louis.

The building strike of San Francisco, which lasted four months, has been settled and construction has started there again. The Intermountain section reports better business in lamps and fixtures, and particularly a flurry in ranges. Exports from Portland and Seattle have shown large increases recently.

NEW YORK

With few and slight price changes since last week jobbers report that activity in wiring supplies continues. Individual orders have not increased in size, but sales are becoming more and more frequent, indicating that there has been no let-up in the steady improvement of conditions. A general feeling of satisfaction and relief was expressed now that the railroad strike is definitely out of the way. An atmosphere of optimism pervades the electrical trade, and confidence in the stability of the improvements seems to increase from week to week.

Credits and collections are improving gradually, although new accounts are opened only after careful investigation. Current credit billings are on a thirty-day to sixty-day basis.

Conduit.—Little change has been shown in the demand for this material. Contractors are ordering in quantities sufficient to meet immediate needs, and the additional 5 per cent discount announced last week apparently has not stimulated buying. Prices quoted this week were as follows: ½-in. black pipe in 2,500 ft. lots, $50.83; ¾-in., $65.32, and 1-in., $93.16 per 1,000 ft. Galvanized pipe in the same sizes was quoted at $55.93, $72.22 and $103.36 per 1,000 ft. Jobbers' stocks in the above sizes are good, but for larger sizes are somewhat spotty.

Rubber-Covered Wire.—The market is slightly stronger than last week, and a few jobbers who have been offering special price inducements have advanced their quotations. No. 14 rubber-covered is quoted at $6.50 per 1,000 ft. in 5,000-ft. lots. Demand is fair for moderate-size quantities and stocks are good.

Flexible Armored Conductor.—The activity on this material continues, and some manufacturers are behind with their deliveries. No. 14 two-wire single-strip is quoted this week at $45 to $46 per 1,000 ft. in lots of that quantity. Double-strip is quoted at $48 per 1,000 ft. Jobbers' stocks are limited.

Lamp Cord.—Although wire prices are stronger this week, jobbers have not advanced this material. No. 18, cotton, twisted, was quoted at $12.90 per 1,000 ft. and the parallel cord in the same size at $15.60. Stocks generally are good.

Loom.—Prices on this material, for which there is very small demand in this territory are easier. In 1,000-ft. lots the ⅜-in. size is quoted at $16.50 to $17 and the ½-in. size from $18 to $18.50 per 1,000 ft.

Metal Moulding.—Demand is small and stocks are kept low. The three-wire size is quoted at $5.60 per 100 ft.

Schedule Material.—The fairly active demand for wiring supplies keeps this material moving well. No price changes were announced this week. Key sockets in standard package lots were quoted at $18.15 per 100 and pull sockets in standard packages at $33 per 100.

Knife Switches.—Manufacturers have reduced prices from 10 to 15 per cent on open-knife switches and slate and porcelain fuse blocks. The dealers' maximum discount, which formerly was 25 per cent, is now 33 per cent off list.

CHICAGO

A few jobbers report a decrease in sales, but in general the electrical business has been fair with few price changes. The interest in building as shown by the suburbs has lent an atmosphere of optimism to the trade. Business in both fractional and large-size horsepower motors is slow, but several dealers interviewed gave the opinion that the large number of fractional-horsepower motors which were being sold at cut prices by irresponsible jobbers have been cleaned up. With this stock disposed of the dealers feel that a fair demand for motors will be noticeable soon.

Manufacturers report an active interest shown in school lighting fixtures throughout the Western States. Building permits issued during the week ended Oct. 28 numbered 216, showing an increase of 166 over the similar period in 1920.

Wire.—This material continues to hold steady and the bare wire base is quoted at 16 cents. Weatherproof has not changed and is selling fairly well at 16 cents a pound in 1,000-lb. lots. Some better sales have been reported this week on No. 14 rubber-covered, wire, although this material is still selling at $6.50 to $6.75 per 1,000-ft. in 5,000-ft. lots.

Conduit.—Several jobbers report an increased movement on this material because of better activity in the building industry in the suburbs. The prices are as follows: For ½-in black pipe in 2,500-ft. lots, $48 to $50; ¾-in., $62 to $65, and 1-in., $97 to $103 per 1,000 ft. Galvanized pipe in the same sizes sells at $53 to $56, $69 to $73 and $104 to $108 per 1,000 ft. Jobbers report their stocks are on about a thirty-day to forty-day basis.

Flexible Armored Conductor.—This material is also moving fairly well, and No. 14 two-wire, double-strip sells at $50 per 1,000 ft. in 5,000-ft. lots.

Porcelain.—"Nail-it" knobs sell for $19.60 per 1,000 in barrel lots, and jobbers report the demand to be fair. Movement on the 3-in. x ½-in. tube continues to be fair, and it sells for $6.44 per 1,000 in barrel lots.

Lamp Cord.—Jobbers report an increase in sales on No. 18 cotton, twisted, which sells for $13 per 1,000 ft. Stocks on hand are ample enough to maintain a good movement of this material.

Heating Appliances.—Portable stoves are reported as the main leaders for the week, although ironers, grills, toasters and open-air heaters are not far behind in activity. Certain jobbers state that their stocks are on approximately a thirty-day basis; other jobbers report a scarcity in stocks of ironers and hair driers.

Loom.—The demand is small and jobbers' stocks are fair. In 1,000-ft. lots the ⅜-in. size sells for $18.50 to $19 and the ½-in. size for $21.

Arc-Welding Apparatus.—An active movement on arc-welding equipment for reclamation purposes is reported by the manufacturers of this material. Stocks are not very heavy.

BOSTON

Better business is apparent throughout New England jobbing circles, and manufacturers of electrical supplies in this section are receiving more orders. The improvement, while slow, is reasonably well maintained week after week. Jobbers' stocks are now low enough to require considerable buying and prices are not deterring purchases as was the case last summer. In the textile field conditions are greatly improved, some of the leading mills being run at about 100 per cent capacity. Woolen and worsted mills are sold up to February, 1922, in some cases.

The unwillingness of labor to take a proposed 25 per cent wage reduction is hampering the shoe business in some quarters, but the demand is excellent. Slow improvement is beginning to be evident in the metal-working industries. The passing of the threatened railroad strike has contributed to better feeling, but New England industries were well prepared for eventualities. Building construction is gradually increasing, and the total contracts of New England for the week ended Oct. 25 were $5,330,900, compared with $4,646,000 for the corresponding week a year ago, and the best for twenty years.

Schedule Material.—Sales are improving, and New England manufacturers of these products are generally reporting improved demand from jobbers. A much healthier fall trade is expected than was apparent Sept. 1. Price readjustments continue, last week registering an advance on a well-known parallel plug of $1.50 per 1,000, f.o.b. factory. Pull sockets are moving well.

Porcelain.—Insulators are moving fairly, with plentiful stocks. A shortage of new code "Nail-it" knobs was reported early in this week among Boston jobbers. These are selling at $18.50 per 1,000 in barrel lots, but deliveries are a little slow. Tubes are plentiful and in fair demand, the 3-in. length, ⅞-in. diameter size selling at $6.20 per 1,000 in barrel lots.

Wire.—Sharp competition features the market, owing largely to accumulated stocks. Rubber-covered, No. 14, sells around $6 per 1,000 ft. in 5,000-ft. lots. The demand is good, owing to improved building construction. Only light sales of weatherproof wire are reported, base price being 16 cents.

Flexible Armored Conductor.—The market is rather quiet, with steady prices. Stocks are ample for current needs. No. 14 single-strip is moving at about $45 per 1,000 ft. at Boston, but in southern Connecticut $40 is being asked.

Washers and Cleaners.—Intensive sales efforts are overcoming the disturbing effect of recent price cuts on washers. Sales are improving slowly, with vigorous concentration on quality characteristics. Cleaners are looking up a little. Stocks are easily maintained.

Transformers.—This equipment is moving fairly well for industrial requirements, and some central-station business is reported on a moderate scale. Smaller and medium sizes are in chief demand in this district.

Meters.—With excellent stocks and only fair demand, distributers are largely marking time. The steady resumption of building work and gradual extension of central-station service are drawing more units into use month by month.

Rigid Conduit.—Trade is a little brisker, although nothing remarkable is evident. Prices are a little easier, about 5 per cent lower being quoted. Representative quotations on ¾-in. black pipe under 5,000 lb. and on galvanized pipe in the same size are $68 and $74.90 per 1,000 ft. respectively.

ATLANTA

Building operations in Atlanta to Nov. 1 have exceeded the entire volume of 1920, the total number of residential permits being 993, with the prospect that the close of the year will see the total number of residences in excess of 1,100. Valuation of permits to date is in excess of $10,000,000. Augusta is also in the midst of a building boom, having approximately $2,000,000 worth of construction under way in that city at the present time. Some of the construction is of the large type, such as hotels and the government hospital. Similar activity is reported from all the other centers in this section.

A storm, the most severe in many years, swept over Florida the first of last week, doing tremendous damage to docks, railways, telegraph and telephone and lighting properties. Prospects for rain have failed to materialize, and the drought throughout the larger portion of this section continues very serious. It has already resulted in the curtailment of power customers by the Carolina Power & Light Company. Request has been made of Secretary Weeks to operate the 60,000-kw. steam plant at the government's nitrate plant in Alabama to assist the situation and forestall the possibility of a more serious condition. No formal reply has yet been received by power companies to their request.

Armored Conductor.—A price advance of 5 per cent is effective this week and has caused some stimulation in sales. Local stocks are ample with quotation on No. 14, two-wire in lots of 5,000 ft., at $57.

Wire.—Rubber-covered, which has advanced 5 per cent in price, is now moving satisfactorily in the smaller sizes and weatherproof in sizes Nos. 6, 8 and 10 is also active. Local stocks are in first-class condition. Prices: Lots of 5,000 ft., rubber-covered, No. 14, $7.08; No. 10, $16.70, and No. 6, $27.40 per 1,000 ft.

Rigid Conduit.—This item continues to move very satisfactorily, particularly in the smaller sizes, and the shortage in ½-in. has been relieved. Prices in small lots are: Black, ½-in., $7.22; ¾-in. $9.42; 1-in. $13.58, and 2-in., $29.56 per 100 ft; galvanized, ½-in. $7.64; ¾-in., $10; 1-in., $14.44, and 2-in. $31.40 per 100 ft.

Knobs and Tubes.—A recent price advance is to be noted on these two items, and the activity is well sustained by small store and residential construction. Prices: Standard packages, 5/16-in. x 3-in. tubes, 80 cents each; "Nail-it" knobs, $22.80 per 1,000. Local stocks are in good condition.

Hollow Ware.—Christmas buying is quite in evidence, very fair orders being received from hardware and department stores, with bona-fide electrical dealers ordering very cautiously. Local stocks are in good condition throughout the line.

Flatirons.—Electrical contractors and dealers seem to be disposing of the majority of flatirons, their orders exceeding those of hardware and department stores for this article. Sales are quite satisfactory and sufficient stocks are on hand.

Cross-Arms.—It is generally rumored that there will be a price advance of 7½ to 10 per cent on all cross-arms, effective Nov. 1. The movement of this item is still quite satisfactory, and jobbers have been fortunate in maintaining sufficient stocks.

ST. LOUIS

With the railroad strike called off, there is manifest more confidence in the immediate future of business. The railroads have been good purchasers of materials used in communication, particularly dry cells, but otherwise the week was about the same as those preceding. The number of orders was possibly slightly less than the week before, but improvement was noted in industrial buying, one concern purchasing a 1,000-kw. generator set. Most of the orders, however, are small and cover only the immediate needs of the purchasers.

Stocks are being maintained by both dealers and jobbers at the lowest possible values; in fact, jobbers are short of a number of items and orders must be filled direct from the manufacturers. Owing to the desire for immediate delivery of goods when ordered, this condition has caused some criticism on the part of the buyers. If the demand should take a sudden increase, local stocks would be quickly exhausted.

The volume of freight handled and earnings by the railroads in this territory continue to show steady improvement. There has been a marked reduction in the number of idle cars during the past thirty days due principally to better movement of coal. Merchandise and farm products are also

moving well. Business in general shows a sustained improvement.

Conduit.—Prices declined about 5 per cent last week. In bundle lots ½-in. black sells for $47.25 per 1,000 ft. and 1-in. black for $88.50. In the galvanized the respective prices are $53.15 and $98.20. There is a fair movement in the ½-in. black, but there is little demand for the larger sizes in black or for the galvanized. Stocks are in fair condition.

Pole-Line Hardware.—A price reduction of about 4½ per cent has been announced. Local stocks will take care of small orders, but factory shipments, which can be made promptly are at times necessary for some orders.

Wire.—There continues to be a good amount of buying of rubber-covered, the price of which in the No. 14 size remains at $6.50 per 1,000 ft. for lots of 5,000 ft., and $6.40 for lots of 10,000 ft. and more. The demand for weatherproof also remains good. Wire of large sizes is extremely quiet. Stocks of small rubber-covered are low.

Lamp Cord.—No. 18 twisted, cotton, is priced at $12.50 per 1,000 ft. in lots of 5,000 ft. or more. The demand is materially better and the market is stiffening. Stocks are ample to meet immediate requirements. Silk-covered is moving slowly.

Packing-House Cord.—No. 14 is selling for $35 per 1,000 ft. in lots of 5,000 ft. or more. The demand shows some improvement but is still comparatively quiet. Stocks are good.

Connector Cords.—Good demand is reported for automobile spark-plug cords, a representative price being 13 cents a set of four in lots of 100 sets. Regular battery connectors are quiet and are priced at $11.50 for a lot of 1,000.

Dry Cells.—Railroads continued to buy in liberal quantities last week, and good sales were made to other purchasers. The regular is quoted at 31 cents and the igniter at 32 cents, both in barrel lots.

Tape.—Jobbers' stocks are getting low, and the demand is good. A local manufacturer of rubber tape reports improving business, though materially under normal. Rubber tape sells from 36 to 40 cents per pound, and friction tape around 38 cents per pound.

SAN FRANCISCO

Pacific coast business men were very relieved by the news that the railroad strike was called off, for although it was generally believed that it would not materialize, such a strike would have paralyzed the business of the Pacific Coast, which is so far away from the manufacturing centers. The recent close of the sixteen weeks' building strike, by act of the unions, involved returning to work on the basis of the new day wage of $9.25 for electrical workers and their waiving of the question of open shop. This has been responsible for a good increase in building in San Francisco, but it is felt that this condition will be disturbed. The present wage agreement will expire early in November, and a decided cut in wages is generally expected at that time.

Insulating Material.—Well assorted stocks are maintained by several jobbers, who report a fair but not exceptional movement, the demand for repairing being considerably less than it was at this time last year. A few price adjustments have occurred, mostly in the nature of general revision and not of correction.

Telephones.—Deliveries both of interphones and farmers' sets are steadily growing better. Four or five fairly large apartment-house installations are made each month and are the cause of keen competition. The financial pessimism of the farmers has greatly cut down the number of farmer lines installed, though business, which was held up by the war for several years, was expected to be far larger than it has proved. The Western Pacific Company has completed the installation of a ten-thousand-dollar train-dispatching equipment from Gerlach, Nev., in its Salt Lake City eastern terminal and is now figuring on a corresponding equipment from Gerlach westward into Oakland.

Ranges.—Pacific Coast stocks of new-type ranges have been received, but there are still a number of ranges of older models to be sold.

Poles.—Local stocks are very heavy as there is almost no buying. Next spring will see some good extension work by the larger companies, but only small maintenance and repair orders from the smaller companies and municipalities are being received now. A similar situation exists as regards the cross-arm supply and demand.

SALT LAKE CITY—DENVER

The satisfactory shipment of crops from the Intermountain agricultural districts to various market centers of the country is an encouraging aspect of the business situation in this territory. The shipment of potatoes, for example, shows a 200 per cent increase up to date over shipments for the corresponding period of last year. The money realized on agricultural produce is in fair circulation, imparting a better tone to business generally. Everything possible is being done to rehabilitate the live-stock industry. Growers are being urged to take full advantage of the loans available through the Federal Loan Corporation.

Electrical dealers are stocking well in such seasonable merchandise as air heaters. Electrical fixtures are moving slightly better, an expected and incidental feature of the home-building campaign. Lamps are feeling the usual impetus that comes with the approach of winter and the lengthening of the evenings. A flurry in the electric range business has come as a result of radically cut prices by one of the largest Intermountain jobbers. The reductions on various models vary from $26 to $85. An overload of stocks in old models is assigned as the occasion for the new but temporary schedule. No changes affecting factory prices have been noted.

SEATTLE—PORTLAND—SPOKANE

The improvement in business throughout the Northwest which began with the first weeks of September continues. This conclusion is verified by reports from various quarters by interests which represent the major business activities of this section. Most of these activities have not only shown an increase to date, but they have shown a more or less uniform increase from week to week and are still moving upward. Exports from both Seattle and Portland continue in large volume. Tonnage in the terminals operated by the Port Commission of Seattle was 71 per cent greater in the last week of October than that of the week ended Aug. 22.

Stormy weather in Portland during the past week caused a falling off in business from the previous week, although business is still fair to good. Portland jobbers report considerable activity in the sales of washing machines and ranges, this being due primarily to active sales campaigns on these two lines. No price changes of importance have been noted during the past week with the exception of a slight increase in fuses. Dealers report business fair. Kilowatt-hour generation of central stations is improving, showing a trend for the better in industrial lines. Generation of one power company was 10 per cent below that of 1920 a month ago, but is now only 5 per cent below that of last year, and present reports indicate that it will equal the 1920 output within the next thirty to sixty days, this in spite of the closing down of a 5,000-kw. shipyard lead during the last six months.

Electrical jobbers of Seattle report continued improvement. The dark days of approaching winter are putting the usual bulge in the demand for lamps and lighting equipment in general. One manufacturer with a branch office in Seattle has designated the week of October 24-29 as "light and power week" and has conducted an active selling campaign, concentrating on small light and power plants, including pumping equipment. The results of this sales effort were most gratifying, an indication that the rural communities are not without purchasing power. Demand is active on sewing machines, washers and ranges. No pronounced price changes were reported for the week. The general trend of prices is in the way of continued small reductions on most items with the exception of copper, which is holding firm. Quotations on fuses in Portland are as follows: 30-amp. cartridge, $13; 60-amp. cartridge, $19.50, and Edison plug fuses, $4 per 100 in carton lots.

Manufacturers' Activities

Devoted to the Business Side of Manufacturing, Distribution and Sales, News from Jobbers and Foreign Fields and a Record of New Devices and Trade Literature

Jeffrey Company Receives U. S. Approval of Mine-Battery Locomotive

Official approval of a storage-battery locomotive for use in gaseous mines has just been issued by the United States Bureau of Mines to the Jeffrey Manufacturing Company, Columbus, Ohio. This is the second approval issued by the bureau and covers a 6-ton storage-battery locomotive, which may be equipped with a battery consisting of either eighty type A-8 Edison cells or forty-eight type MV twenty-one-plate "Iron Clad Exide" cells. Caustic potash is specified as the electrolyte for use with the Edison battery. The first official approval of a storage-battery locomotive was granted to the George D. Whitcomb Company a few months ago.

Two other locomotives, representing the product of two additional manufacturers, are now under test. Conferences have also been held with two more manufacturers regarding the investigations of their product under Schedule 15. This indicates a decided interest in the efforts of the Bureau of Mines to safeguard this type of mining equipment. Each approved equipment will have an approval plate attached to the controller bearing the seal of the Department of the Interior, Bureau of Mines, and including a cautionary statement which should aid both company and state inspectors in keeping these locomotives in a permissible condition.

The testing of storage-battery locomotives for permissibility is in charge of L. C. Ilsley, electrical engineer of the Pittsburgh experiment station of the bureau.

Stoker Manufacturers Hold Fall Meeting

The fall meeting of the Stoker Manufacturers' Association was held Oct. 18-20 at Shawnee-on-Delaware, the representatives of member companies and guests numbering about seventy in all.

President Maxwell Alpern delivered his address on Tuesday morning and was followed by C. W. DeForest of the Union Gas & Electric Company, Cincinnati, who read a paper on "The Necessity for and Savings Possible with Better Boiler-Room Operation." The research committee presented its report in the evening.

On the following day a paper outlining the "Uses and Character of Equipment Desired for Blast and Induced-Draft Stokers" was read by H. F. Fagan, representing the National Association of Fan Manufacturers. On Thursday the committees of conference with other associations presented their reports. With various committees of the A. S. M. E. had been discussed the proper standard front for water-tube boilers and the matter of a revision of the boiler test code, while arrangements had been made to present a series of stoker papers at the spring meeting of the Fuel Division of the A. S. M. E. The stoker manufacturers' engineering committee had made a study of stoker auxiliaries. At the same session S. L. Nicholson gave the results of a conference with Secretary Hoover on how the association and similar ones could best help the activities of the Department of Commerce.

Rockbestos Finds Demand for Heater Cord Improving

A healthy increase is apparent in the demand for asbestos wire, according to a statement made by Guy Hutchinson, vice-president of the Rockbestos Products Corporation, New Haven, Conn., to a representative of the ELECTRICAL WORLD a few days ago. Inquiries are more active than for some time, and, while the demand for wire for appliance service is not so active as it is expected to be later, orders for stove wire and motion-picture cable are more vigorous. The September business of the company in these lines was more than 50 per cent of that of September, 1920, which was the peak month in the organization's history. The September business was the best in 1921.

Electrical Credit Association to Hold Annual Meeting in Chicago

The annual meeting of the Electrical Credit Association, Central Division, will be held at the Drake Hotel, Chicago, Nov. 17 and 18. Among the subjects to be discussed are: "Credits and Reconstruction," by E. W. Shepard, credit manager Western Electric Company, New York City; "Business and the Industrial Press," by Stanley A. Dennis, associate editor *Electrical Merchandising*, New York City; "Supplemental E. C. A. Service and Interchange Bureau Data," by Henry Schwab, Monarch Electric & Wire Company, Chicago; "How I Believe Difficult Credit and Collection Problems Should Be Handled During These Critical Times," by W. E. Sargent, Cutler-Hammer Manufacturing Company, Milwaukee; "Problems Surrounding Municipal Accounts," by C. E. Vandel, Western Electric Company, Kansas City, and "Sample Credit and Collection Forms," by H. H. Pribbanow, Julius Andrae & Sons Company, Milwaukee.

Formica Insulation Company Wins Decisions in Patent Suits

Actions Brought by the Westinghouse Electric & Manufacturing Company and Continental Fibre Company Dismissed—Insulation Patents Declared Not Infringed

Decision has been rendered in the federal court at Cincinnati in favor of the Formica Insulation Company, Cincinnati, in three suits alleging patent infringement, two of them filed by the Westinghouse Electric & Manufacturing Company and the other by the Continental Fibre Company. Another one brought by the Westinghouse company was decided in favor of the defendant last year. The claim of the plaintiffs in all four suits was that the Formica company was infringing rights alleged to belong to them exclusively by the use of certain processes in building up laminated insulating materials.

One suit filed by the Westinghouse company was an action for an injunction against infringement of the Haefely patent for a machine for the manufacturing of insulating tubes. The primary inquiry concerned infringement, and the essential question in the case was whether two pressure rolls, with their allied mechanism, of the defendant's machine constitute an equivalent for "a longitudinally recessed mandrel holder," which is the vital element of the claims of which infringement is alleged.

The invention has to do with machines for the manufacture of insulating tubes composed of layers of paper or other fiber and some binding material by the process of winding upon a mandrel and at the same time applying the necessary heat and pressure to produce a tube having a hard composite wall suitable for insulating purposes.

The decision found that the machine of the defendant did parallel in function the plaintiff's mandrel holder, but that it did not actually function in the same way and that the difference was real and substantial. Therefore, it was decided, infringement did not exist.

The second suit of the Westinghouse company was also an action for an injunction against infringement of patent on a process of building up laminations of paper or cloth and hardening them with a phenolic condensation product under pressure and heat. It was claimed in answer that the plaintiff had delayed taking legal steps for a number of years and therefore was estopped by laches. In this suit it was shown that the incorporators of the Formica company had been in the employ of the plaintiff and that one of them, D. J. O'Conor, while with the Westinghouse company in 1913, endeavored to secure a patent on the process and at the same time assigned his rights in the invention to the plaintiff.

This patent claim was rejected as were several later amended claims until in March, 1918, certain parts were allowed. During a great part of this time the defendant was using the process, O'Conor and H. A. Faber having resigned from the Westinghouse com-

pany, but the plaintiff raised no objection. Therefore, the court ruled, the plaintiff by reason of delay had forfeited its right to protest at the present time.

The suit of the Continental Fibre Company concerned infringement of a patent on a composite material composed of laminations of fibrous materials, saturated throughout with approximate uniformity with a phenolic condensation product. It was decided that there was no advance in invention over the prior art of performing this work, but only in a more skillful selection of material and greater thoroughness of workmanship. The court then declared the patent invalid.

G. E. Lighting Exhibits to Tour Again

The lighting conferences and demonstrations, or industrial and commercial lighting exhibits, which were held last winter and spring by the Edison Lamp Works of the General Electric Company in the leading distributing centers of the country are again to be conducted. A total of nearly 11,000 attended these demonstrations last year, and the result was not only the selling of the better-illumination idea, but orders direct and prospective for the jobbers.

During October of this year the conference and demonstration was held in the following cities of New York State: Albany, Glens Falls, Amsterdam, Utica, Ilion, Rochester and Buffalo. The present plan is to have this exhibit continue into Ohio, Indiana, Michigan and Illinois, down along the Mississippi, across Tennessee and back to Harrison, N. J. It is expected that another booth and demonstrators will tour the New England States and New Jersey, starting about Nov. 1.

The methods followed are essentially the same as before. Demonstrations of various types of lighting units, ranging all the way from unshaded glaring lamps to the latest, best and most efficient units, are given in a portable canvas booth. Thus those who attend have an opportunity to judge for themselves the relative effiicency and desirability of the different types, being aided by foot-candle meters which are distributed among them. A miniature show window forms part of the exhibit, and during the demonstration it is lighted with colored lights, showing the effects that may be obtained in show-window illumination not only by the use of the primary colors but by combinations of them.

Last winter and spring three booths, accompanied by demonstrators, were on tour. Seventy-two cities in twenty-three states were visited, and the total attendance was approximately 10,800. Seventy-five per cent of those attending were industrial executives, such as presidents, secretaries, purchasing agents and superintendents of industrial concerns. Ten per cent were industrial men, such as foremen and electricians, while another 10 per cent consisted of representatives of civic concerns, such as chambers of commerce, boards of trade and Rotary and Kiwanis clubs. The remaining 5 per cent was made up of engineers, architects, teachers, students, and the general public.

The demonstrations are given with the co-operation of the jobbers in the territory where they are held.

Holtzer-Cabot Produces Record-Size Alarm Control

The largest fire-alarm and watchman control that the Holtzer-Cabot Electric Company, Roxbury, Boston, has ever turned out is now installed in the new plant of the Kelly-Springfield Tire Company, Cumberland, Md. The new buildings cover 12 acres and there are 22 acres of floor space.

An interesting feature of the whole system is the amount of material entering into its manufacture. The control board itself is 9 ft. 8 in. long and 6 ft. 2 in. high and controls six box circuits, ten gong circuits, ten to fifteen station watch routes, ten telephone circuits, twenty-seven combination fire watch and telephone boxes, twenty-six combination fire and watch boxes, thirty-eight plain watch stations, two plain fire alarm stations and two watch and telephone stations. There are 45 miles of wire, including underground cable, used in the system and 2 miles of conduit.

BOARD USED TO CONTROL LARGE ALARM SYSTEM AT KELLY-SPRINGFIELD COMPANY PLANT

New Company to Install Coal Pulverizers

The Powdered Coal Development Corporation, which controls the Pruden patents for the burning of pulverized coal in the western half of the United States, has been organized, with headquarters at Omaha, Neb. The company is actively engaged in financing and erecting central pulverizing plants and the installation of equipment for burning pulverized coal. Byron B. Oberst, formerly with the Interstate Oil & Refining Company, is president of the company. The board of directors includes R. M. Robertson, construction engineer of the American Smelting & Refining Company; A. E. Hall, manager Omaha plant of the American Smelting & Refining Company; Joseph C. Weeth, president of the Harmon Weeth Coal Company; J. J. Dodds, president of the Dodds Lumber Company; Bert Phillips, formerly chief engineer Omaha plant of the Collis Products Company, and Irving H. Arey, with the Republic Metal Ware Company.

The Belden Manufacturing Company of Chicago has appointed C. P. Cushway as manager of its cable and specialties department, effective Nov. 1. Mr. Cushway will supervise the production of telephone, automobile and appliance-cord assemblies, flexible cable, cordage and insulating materials.

The DeFerrorized Asbestos Corporation, Railway Exchange Building, Chicago, has been formed to manufacture and market a form of asbestos paper from which all iron has been eliminated for use as an insulating material. R. C. Hallowell is president and J. F. Green vice-president of the concern.

Nelson S. Moore & Company, district agents for the Jeffery-Dewitt Insulator Company, have opened an office at 19 South Wells Street, Chicago. They will also handle a line of air-break switches and other high-tension equipment as well as other electrical equipment.

The Blaw-Knox Company, 613 Farmers' Bank Building, Pittsburgh, announces the addition of H. O. Davidson to its staff. He is to have entire charge of the Prudential sectional building department of the company and will also be manager of the C. D. Pruden plant of the company at Baltimore, where he will be stationed. Mr. Davidson was for eight years connected with the Hydraulic Steel Craft Company, of which he was general manager, when he severed his connection with that company to join the Blaw-Know Company.

The Rubber Insulated Metal Corporation, 91 William Street, New York City, now has as its president C. P. L. Huston, who was the organizer of the company and who has taken back the control and management from the Century-Plainfield Tire Company. It is intended to pursue exclusively the manufacture of mechanical rubber goods, the "Elchemco" process being used in the manufacture of "Rimco" insulation for such articles as pliers, screwdrivers, flexible couplings, etc. William F. Hart, who was the sales manager of the company, has resumed his former office. The executive office will be at the above address and all business transactions will be handled there.

The Cincinnati Hy-Speed Machine Company, Cincinnati, announces that it has made an exclusive selling arrangement with the Niles-Bement-Pond Company, New York City, covering its full line of "Hy-Speed" products.

The Lamson Company, 100 Boylston Street, Boston, manufacturer of pneumatic tubes, conveyors, elevators, etc., has awarded a contract for the construction of four buildings at its proposed new works at Syracuse, N. Y. Work has already been started on the project, and it is expected that it will be completed early in the spring of 1922.

Shapiro & Aronson, 20 Warren Street, New York City, manufacturers of electric and gas fixtures, have filed notice of increase in capital stock from $250,000 to $350,000.

Foreign Trade Notes

PROPOSED ELECTRIC LIGHT PLANT AND TELEPHONE SERVICE IN CHINA.—Surveys are being undertaken at Ch'ihfeng (Hata) in the Jehol administrative area, according to a recent issue of the *Bulletin* of the Chinese Government Bureau of Economic Information, for the installation of a telephone service and an electric light plant under semi-official auspices. The Sun Fan Electric Light Company formed by Hsu Tsin has petitioned the Ministry of Communications and the Ministry of Agriculture and Commerce for registration. The Kuang Hua Electric Light Company, organized by Wang Yu-wan at Louhokou, has been registered by the Ministry of Agriculture and Commerce.

HYDRO-ELECTRIC PROJECTS PROPOSED AND UNDER WAY IN NEW SOUTH WALES.—The report of William Corin, chief engineer of the New South Wales (Australia) Department of Public Works, electrical engineering branch, for the year ended June 30, according to the *Electrician* states that the volume of work dealt with has greatly increased, owing to the passing of the hydro-electric development act and the local government act. The former resulted in the preparations of plans for the Barren Jack and Nymboida power stations and the latter caused a large number of municipal proposals to be referred to Mr. Corbin. The investigation of the water power of the state was continued and further surveys are to be made. The final scheme for the Snowy River power project shows that 24,000 kw. can be developed at a cost of about £2,000,000. The Clarence River project, it is estimated, will provide about 80,000 hp. If the Kiewa power in Victoria were developed and connected with the Hume power in New South Wales less conservation would be required, and the matter should be decided upon after conference with the Victorian Electricity Commissioners. In connection with the Barren Jack scheme which the government has definitely decided to carry out there is within a radius of less than 100 miles an immediate demand of about 9,000,000 units per annum, with a maximum demand of 2,000 kw., while within easy transmission distance there is a demand for 15,000,000 kw.-hr. and a maximum demand of 4,250 kw. Tenders have been invited for the plant for the Nymboida project, designed to meet a load of 500 kw. at the outset, as well as the much larger undertaking on the Clarence River, of which it will form the first unit.

UNITED STATES TO HAVE EXHIBIT AT BRAZIL CENTENNIAL. — The bill carrying an appropriation of $1,000,000 to provide for an American building and exhibit at the exposition to be held at Rio de Janeiro next year to celebrate the centennial of Brazilian independence has been passed by the United States Senate.

SECOND ANNUAL MEETING OF THE INTERNATIONAL CHAMBER OF COMMERCE.—The second annual meeting of the International Chamber of Commerce will be held at Rome, Italy, in September, 1922.

AUTOMATIC TELEPHONE SYSTEM FOR BOMBAY, INDIA.—The installation of an automatic telephone system in Bombay within three years, according to *Electrical Industries*, is under consideration by the Bombay Telephone Company. The plan proposes for 15,000 lines, to cost about £400,000, providing for the introduction of a full automatic plant. The government of India, it is understood, is prepared to extend the license of the company for twenty years in case the company installs an automatic or a modern central-battery system.

Foreign Trade Opportunities

Following are listed opportunities to enter foreign markets. Where the item is numbered, further information can be obtained from the Bureau of Foreign and Domestic Commerce, Washington, by mentioning the number:

A merchant in Spain (No. 244) desires to purchase and secure an agency for the sale of copper bars and copper wire, both insulated and plain, for commercial electric wiring, and all necessary accessories.

A firm of importers in India (No. 252) desires to purchase and secure an agency from manufacturerers for the sale of electric novelties, etc.

A commercial agency firm with offices and warehouses in France (No. 254) desires to secure an agency from manufacturers for the sale of electrical apparatus and equipment, hardware and tools, etc.

A mercantile firm in France (No. 223) desires to be placed in communication with exporters able to furnish electrolytic copper in ingots or in bars.

WIRELESS APPARATUS FOR SPANISH ARMY.—The Spanish government has advertised for bids on wireless apparatus for its army, according to a cable from Consul Merrill at Madrid. Bids, which should be received by Nov. 30, should be made through responsible Spanish interests or through a local American agent. The Spanish law requires that bids be in certain forms, which are being forwarded and will be available to parties interested on application to the Electrical Equipment Division of the Bureau of Foreign and Domestic Commerce.

EXTENSIONS TO MUNICIPAL ELECTRIC PLANT AT CAPE TOWN, SOUTH AFRICA. — New equipment is being installed in the electric power plant at Cape Town which will greatly increase the output of the plant. The Cape Town Electricity Department, "in accordance with plan" has for some time been gradually substituting three-phase, alternating current in place of direct current in various districts, the intention being to provide the whole of the municipal area with this service, the city proper remaining on direct current.

New Apparatus and Publications

MOTORS.—The Imperial Electric Company, Firestone Park Station, Akron, Ohio, is distributing two circulars, one entitled "A Motor for Every Purpose" and the other "The Motor Built on a Creed," covering its different types of motors and generators.

ELECTRIC HEATER — An electric heater for library use has been developed by the Majestic Electric Development Company, 1705 Allegheny Avenue, Philadelphia.

ELECTRIC GRILL—Landers, Frary & Clark, New Britain, Conn., has recently placed on the market a "Universal" triple-heat electric grill set.

PORTABLE SEWING MACHINE—The Davis Sewing Machine Company, Dayton, Ohio., has placed on the market a "Bluebird" portable sewing machine.

LIGHT AND POWER PLANT — The Lincoln Light Corporation of Milwaukee, 151 Seventh Street, Milwaukee, has placed on the market a 1-kw. direct-driven light and power plant with enclosing casing.

COIL WINDING MACHINE—The Armature Coil Equipment Company, 3202 Scranton Road, Cleveland, has recently developed a pulley-driven coil winding machine.

BUTTON MAKING AND INSERTING MACHINE—A machine for button making and pigtail inserting machine has been placed on the market by the Sturdy Mechanical Laboratories, 532 West Twenty-second Street, New York City.

ELECTRIC WASHER—A device which cooks and steams the laundry in an ordinary wash tub, known as the "Electro Washer," has been placed on the market by the Electro Thermo Company, Inc., 206 Broadway, New York City.

EXCAVATING MACHINERY. — "Excavating Equipment" is the title of bulletin 56X, recently issued by the Pawling & Harnischfeger Company, Thirty-eighth and National Avenues, Milwaukee, in which it describes the use of "P. & H." excavators under various conditions of service and application.

STREET-LIGHTING FIXTURES. — The Erie Equipment Company, Inc., Johnstown, Pa., is distributing a leaflet covering the new "Erie" mast arm, supporting bracket, dual insulator pin, etc., for street-lighting.

BLOWERS AND FANS.—The Ilg Electric Ventilating Company, 2850 North Crawford Avenue Chicago, has issued a circular describing the various types of its "Ilg" self-cooled motor propeller fans and blowers.

ATTACHMENT PLUG CAP.— The Cutler-Hammer Manufacturing Company, Milwaukee, has recently developed a non-breakable attachment plug cap, "Dreadnaught," for use on electric flatirons, washing machines, vacuum cleaners, etc.

AUTOMATIC FIRE ALARM.—The Aero Alarm Company, 26 Cortland Street, New York City, has issued a booklet covering the "Aero" automatic fire alarm.

FLUSH DOOR RECEPTACLES. — Bulletin No. 17-2, issued by Harvey Hubbell, Inc., Bridgeport, Conn., describes the new "Hubbell" single and duplex flush door receptacles recently developed by the company.

STORAGE-BATTERY TRUCKS. — The Lakewood Engineering Company, Cleveland, is distributing a booklet entitled "The Unbelievable 30%" describing its various types of storage-battery trucks for use in industrial and manufacturing plants.

TRACTOR CRANE. — The Industrial Works, Bay City, Mich., manufacturer of wrecking, locomotive and freight cranes, etc., has recently placed on the market its type BC "Industrial" crawling tractor crane.

ELECTRIC HEATER. — The Carmean Electric Company, 2806 East Eighteenth Street, Kansas City, Mo., manufacturer of electric heaters and electric heating systems, has placed on the market a new "Carmean" motor-driven electric heater.

New Incorporations

THE FARMERS' CO-OPERATIVE LIGHT & POWER COMPANY, Olympia, Wash., has been incorporated by A. G. West, W. R. Taylor, R. Gerth, C. E. Conn and Elmer Walker. The company is capitalized at $10,000.

THE GRAVITY ELECTRIC SWITCH COMPANY, Portland, Ore., has been incorporated with a capital stock of $50,000 to manufacture and deal in gravity and electrical switches and automobile accessories. B. J. Hecker 125 Fourth Street, Portland, is interested in the company.

THE ADAMS BASIN (N. Y.) ELECTRIC LIGHT & POWER COMPANY has been formed to operate a local electric light and power plant. J. J. Ginther and G. R. Ward, Adams Basin, are interested in the company.

THE PENCE MANUFACTURING COMPANY, Warsaw, Ind., has been incorporated with a capital stock of $25,000 to manufacture metal products and electrical specialties. The incorporators are H. O. Pence, I. R. Klinger and G. W. Polk, all of Warsaw.

THE PRESTO ELECTRIC DEVICES COMPANY, Phoenix National Bank Building, Hartford, Conn., has been incorporated to manufacture electrical specialties. The directors of the company are E. F. Kaiser, president and treasurer; and T. H. Grace, vice-president.

THE PARKWAY ELECTRIC COMPANY, Brooklyn, N. Y., has been organized with a capital stock of $5,000 to manufacture electrical equipment. The incorporators are B. E. Simmons, L. M. Wilk and D. Moran. The company is represented by Eisenberg & Eisenberg, 1475 Broadway, New York City.

THE TRI-ELECTRIC COMPANY, New York, N. Y., has been incorporated by W. A. Doyen, W. A. Klein and E. S. Klausner, 80 Delancey Street. The company is capitalized at $10,000 and proposes to manufacture electrical specialties.

THE SUNLIGHT ARC COMPANY, New York, N. Y., has been chartered under the laws of the State of Delaware with a capital stock of $22,000,000 to manufacture electric arc lamps and kindred products. The incorporators are J. Austin Hermer, Herman F. Harris and W. E. Haskin. The company is represented by the Capital Trust Company, Dover, Del.

THE CORNISHVILLE (KY.) LIGHTING COMPANY has been organized with a capital stock of $3,000 by S. H. Gardner, Bishop Wash and W. W. Gibson.

THE ORANGE & ROCKLAND ELECTRICAL SUPPLY COMPANY, Monroe, N. Y., has been chartered with a capital stock of $100,000 to manufacture electrical machinery, devices, etc. The directors of the company are Roscoe W. Smith and Alfred J. Crane, both of Monroe, and Frank Durland of Chester.

THE BAYARD (OHIO) ELECTRIC LIGHT COMPANY has been organized by F. L. Summer, R. H. Morehead, John Schrader, Albert Whitacre and George Bisson. The company is capitalized at $5,000.

THE MAGIC ELECTRIC WATER HEATER COMPANY, New York, N. Y., has been incorporated with a capital stock of $50,000 by F. Bellak, J. Monte and J. Meyers. M. Wolff, 41 Park Row, is attorney.

Record of Electrical Patents

Notes on United States Patents

(Issued Sept. 27, 1921.)

1,392,266. PROCESS FOR THE MANUFACTURE OF CARBON ELECTRODES OR OF PURE RETORT CARBON; Emerich Szarvasy, Budapest, Hungary. App. filed June 3, 1920. Subjecting methane to thermal decomposition.

1,392,267. PROCESS FOR THE MANUFACTURE OF CARBON ELECTRODES; Emerich Szarvasy, Budapest, Hungary. App. filed June 3, 1920. Kneading carbon with tarry binding agent.

(Issued Oct. 4, 1921)

1,392,293. SIGNALING SYSTEM; Bornett L. Bobroff, Milwaukee, Wis. App. filed Jan. 5, 1918. For use in hospitals and sanitariums.

1,392,302. TELEGRAPHY; Kenwrick C. Cox, Norfolk Island, South Pacific. App. filed July 17, 1917. Submarine telegraphy in which a selenium relay is employed.

1,392,378. CONTROLLING MECHANISM; Louie E. Willard, Chula, Ark. App. filed Nov. 6, 1916. Speed controlling mechanisms for various kinds of machinery.

1,392,420. PORTABLE ELECTRIC LIGHT; Harry M. Koretzky, New York, N. Y. App. filed March 10, 1920. Mounting for lamp and reflector readily applied to metallic or non-metallic casing.

1,392,436. METHOD OF AND APPARATUS FOR ARC WELDING; Harry D. Morton, Detroit, Mich. App. filed Dec. 2, 1918. Means for accurately correlating rate of fusion and rate of feed.

1,392,437. ARC-WELDING SYSTEM AND METHOD OF OPERATING THE SAME; Harry D. Morton, Detroit, Mich. App. filed Dec. 2, 1918. Automatic and semi-automatic apparatus.

1,392,524. PROCESS FOR THE PURIFYING AND CLARIFYING OF WATER; Miguel Puiggari and Nestor Venezia, Buenos Aires, Argentina. App. filed Nov. 24, 1917. Submitting to action of an electric current of high tension.

1,392,553. ELECTRICALLY HEATED STAMPING MACHINE; Jean Bill, Legnano, Italy. App. filed April 4, 1918. For machines in which rivets, bolts and the like are manufactured.

1,392,555. STARTING INDUCTION MOTORS; Johannes Bruncken, Cologne-Bickendorf, Germany. App. filed Dec. 2, 1920. Double induction motor constructed for starting.

1,392,557. INSULATION FOR ARMATURES; Jasper F. Cullin, Detroit, Mich. App. filed Dec. 29, 1919. No tape or sleeving used.

1,392,558. ELECTRIC COUPLING; William A. Darrah and Rex G. Averill, Mansfield, Ohio. App. filed Aug. 20, 1917. Used in connecting a plurality of separate and distinct circuits.

1,392,560. TROLLEY; Manuel D. Dominguez, New Orleans, La. App. filed Feb. 10, 1921. Trolley wheel cannot leave the wire.

1,392,563. BRUSH CONNECTION; Howard B. Eynon, Wellsville, N. Y. App. filed Nov. 9, 1920. Methods of securing cable ends to brushes.

1,392,609. METHOD AND MEANS OF SELECTION; Charles R. Underhill, New Haven, Conn. App. filed Nov. 19, 1915. For selecting from stock of suitable movable elements a series or combination of elements.

1,392,686. CAR HEATER; Lee P. Hynes, Albany, N. Y. App. filed July 2, 1919. Installed under car seat.

1,392,742. BALANCING RELAY; Willard E. Brantigam, Avery, Idaho. App. filed Jan. 2, 1920. For railway cars wherein the propelling motor is utilized to recharge the storage battery.

1,392,762. SELECTIVE TELEPHONE SYSTEM; Ruben C. M. Hastings, Columbus, Ohio. App. filed Nov. 28, 1913. Substations may be shunted from the line.

1,392,802. ELECTRIC FIRELESS COOKER AND RANGE; Lemuel W. Serrell, New York, N. Y. App. filed Oct. 31, 1919. Of moderate size and simple construction.

1,392,815. METHOD AND MEANS OF DETECTING IRREGULARITIES IN TRANSMISSION LINES; George Crisson, Hoboken, N. J. App. filed Oct. 15, 1919. Long-distance telephone line.

1,392,840. SANITARY TELEPHONE DEVICE; W. W. Lukenbach, Philadelphia, Pa. App. filed Sept. 28, 1920. For holding the receiver when looking up information.

1,392,846. TROLLEY MOUNT; Hugh J. Murphy and Edward F. Murphy, Troy, N. Y. App. filed Feb. 23, 1921. To prevent injury to cross-wires and other overhead structure.

(Issued Oct. 11, 1921)

1,392,944. STERILIZER; Albert H. Jessup, Erie, Pa. App. filed Feb. 3, 1920. For sterilizing surgical instruments and dressings.

1,392,965. ELECTRIC STEEL FURNACE; Herman F. Priwer, Springfield, Ohio. App. filed June 15, 1920. Easily and quickly charged.

1,392,996. ELECTRIC GENERATOR BRUSH HOLDER; Charles F. Willey, Louisville, Ky. App. filed May 27, 1921. Improved spring arrangement.

1,393,018. RELAY; Peter C. Hewitt, Ringwood Manor, N. J. App. filed May 9, 1916. Use in evacuated apparatus with more than one conductor that may act as cathode.

1,393,019. CONSTANT-CURRENT DISTRIBUTION SYSTEM; Peter C. Hewitt, Ringwood Manor, N. J. App. filed Sept. 12, 1916. For obtaining constant current in circuit having variable electrical characteristics.

1,393,038. ELECTRIC GENERATOR AND MOTOR; Robert Rankin, Leamington Spa, England. App. filed Dec. 15, 1920. Self-regulating machine.

1,393,043. PULL SOCKET; Ralph A. Belmont, New York, N. Y. App. filed April 28, 1916. Does away with number of springs heretofore used.

1,393,077. ELECTRICAL CONDENSER; William C. Brinton, Jr., Kennett Square, Pa. App. filed Oct. 8, 1918. Elimination of moisture and reduction of tendency to "store."

1,393,089. MULTIPLE-CABLE GLAND FOR BULKHEADS AND THE LIKE AND PLASTIC FILLING COMPOUND THEREFOR; James H. Collie, Birkenhead, England. App. filed Jan. 13, 1919.

1,393,141. METHOD AND MEANS FOR IMPROVING THE COMMUTATION OF DYNAMO-ELECTRIC MACHINES; Jaroslaw K. Kostko, St. Louis, Mo. App. filed Sept. 18, 1916.

1,393,228. PROTECTIVE DEVICE FOR ALTERNATING-CURRENT ELECTRIC SYSTEMS; Albert E. McColl, Dumbarton, Scotland. App. filed Dec. 31, 1919. Prompt disconnection of faulty apparatus or circuits.

1,393,231. DEVICE OR ARRANGEMENT FOR THE CONTINUOUS MOVEMENT OF ROLLING OR SLIDING BODIES; Edmund Magerle and Hermann Martinek, Vienna, Austria. App. filed June 10, 1914. For advertising purposes.

1,393,254. TROLLEY HEAD; Ivan van der Streaten, Liège, Belgium. App. filed May 24, 1920. Adapted to oscillate about its axis.

1,393,275. ANNUNCIATOR; Hector A. Franz, Hood River, Ore. App. filed Nov. 1, 1919. Selective alarm type.

1,393,320. ADJUSTABLE ELECTRIC HEATER; Milton H. Shoenberg and George J. Henry, San Francisco, Cal. App. filed Oct. 1, 1919. Adjustment in several directions.

1,393,321. RADIANT HEATER; Milton H. Schoenberg and George J. Henry, San Francisco, Cal. App. filed Oct. 1, 1919. Zone of radiating heat extending at right angles to the axis of reflector.

1,393,323. METHOD OF ELECTRIC THERMAL CONTROL; Milton H. Shoenberg, San Francisco, Cal. App. filed Dec. 27, 1919. Prevents overheating.

1,393,325. ELECTRIC HEATING ELEMENT; Luther D. Smith, Toledo, Ohio. App. filed Feb. 24, 1919. Resistance wire stranded and twisted.

1,393,326. TELEPHONE SYSTEM; Arthur B. Sperry, New York, N. Y. App. filed July 26, 1917. Number-indicating devices.

1,393,344. METHOD OF AND MEANS FOR SWITCHING; Nicholas J. Conrad, Chicago, Ill. App. filed Sept. 24, 1917. Current broken by portable switch shunted around stationary knife switch.

Construction News

Projects, Plans, Bids and Contracts, Contemplated or Under Way

New England States

ROCKLAND, ME.—The Knox County Electric Company has submitted a proposal to the street-lighting committee whereby thirty-one ornamental standards surmounted with 600 cp. lamps can be erected on Main Street and the present incandescent lamps increased from 60 cp. to 100 cp. The cost to the company is estimated at $10,000.

ANDOVER, N. H.—A movement has been started to organize a company for the purpose of securing electricity in Andover. It is proposed to extend the lines from East Andover. The Franklin Light & Power Company supplies electricity in East Andover.

FREEDOM, N. H.—The Freedom Electric Company was recently incorporated to take over the business of the Freedom Electric Light & Power Association. The company operates in Center Ossipee, Effingham Falls and Freedom Village. Arthur P. Merrow is president.

RUTLAND, VT.—The Hortonia Power Company, affiliated with the Port Henry (N. Y.) Light, Heat & Power Company, has plans under consideration for improvements and additions to its systems during the next two years, to cost about $300,000. The installation of a 500 kw. hydro-electric generating unit to operate at present under an 18 ft. head will be made immediately at Weybridge, Conn., where an ultimate 3,500 kw. will be developed under a 30 ft. head. The systems now operating at 25 cycles and 60 cycles will be inter-connected through a 1,000 kw. frequency-changer set and voltage regulation will be provided for by line changes and the installation of automatic regulators. The above additions and improvements together with the development and enlargement of storage reservoirs will increase the output of the plans of the Hortonia and Port Henry companies approximately 50 per cent.

BROCKTON, MASS.—The W. L. Douglas Shoe Company is planning an addition to its power house. J. William Beal Sons, 62 Summer Street, Boston, are architects.

FALL RIVER, MASS.—The Fall River Electric Light Company has filed notice of an increase of $700,000 in capital stock.

GREAT BARRINGTON, MASS. — The Southern Berkshire Power & Electric Company is considering the erection of a transmission line to its new plant at Rockdale.

NEW HAVEN, CONN.—An appropriation of $12,000 has been approved by the board of finance for the installation of an electrically operated traveling crane at the city wharf.

WINSDOR LOCKS, CONN. — Permission has been granted to the Connecticut River Company, Pearl Street, Hartford, by the Federal Power Commission for the construction of a hydro-electric generating plant at Windsor Locks. C. H. Tenney, 201 Devonshire Street, Boston, is engineer.

Middle Atlantic States

BALDWIN, N. Y.—The installation of an electric street-lighting system in Baldwin Harbor is under consideration. The Baldwin Harbor Civic Association is interested.

BUFFALO, N. Y.—The Council is considering the installation of 331 arc lamps in Buffalo, of which 270 will be required for Main Street.

BUFFALO, N. Y.—The City Council has passed an ordinance requiring the electrification of the steam railroad lines within the city limits. The ordinance further provides that a plan for the electrification be submitted by Feb. 1, 1922, and that it be put in operation a year later. Frank C. Perkins is commissioner.

ITHACA, N. Y.—Bids will be received by Mr. C. D. Bostwick, comptroller Cornell University, until Nov. 10, for construction, electric, heating and sanitary work. In-

cluding electric work-packing and cold-storage plant for the department of pomology at the New York State College of Agriculture, Cornell University, Ithaca, N. Y. Drawings, specifications and blank forms of proposal may be obtained at the Department of Architecture, Capitol, Albany. L. F. Pilcher is state architect.

NEW YORK, N. Y.—Plans have been filed by the New York Steam Corporation, 280 Madison Avenue, for extensions and improvements to its power house at 507-19 East Fifty-ninth Street, to cost about $300,000, including equipment.

RICHMOND, N. Y.—Application has been made by Grover A. Whalen, commissioner of plant and structures, Muncipal Building, New York City, to the Board of Estimate for an appropriation of $177,700 for equipment for a trackless trolley system between Richmond and Tottenville, Staten Island. The present plans provide for a new electric generator and auxiliary power equipment at the Sea View power plant, automatic electric substation, cables and wires for transmission lines, feeder lines and overhead trolley system.

JERSEY CITY, N. J.—Plans have been prepared by the Vulcan Iron Works, Hudson and Exeter Streets, for rebuilding the power plant at its works, recently destroyed by fire. The cost is estimated at $40,000.

MONTCLAIR, N. J.—An ordinance providing for improvements to the street-lighting system in Montclair, to cost about $45,000, was recently introduced at a meeting of the Board of Commissioners, and passed its first reading. James T. Hanan is director of public improvements.

HARRISBURG, PA. — The City Commission is considering plans for the installation of a new street-lighting system on a portion of North Second Street, which will require lamps varying from 400 cp. to 600 cp. S. F. Hassler is commissioner in charge.

HAZLETON, PA.—A tentative agreement has been reached by the City Council and the Pennsylvania Power & Light Company in connection with a ten-year street-lighting contract to become effective Jan. 1, 1922. The new contract provides for an increase in the candlepower now in use 120 per cent, giving Hazleton from 533 to 600 arc lamps. The change in the lighting system will necessitate extensions and improvements to the substation at Lincoln Street and Diamond Avenue.

HELVETIA, PA.—Work is under way by the Rochester & Pittsburgh Coal & Iron Company, Punxsutawney, on the construction of an electric generating plant at Helvetia. The proposed plant will have an initial capacity of 3,000 hp.

WILMINGTON, DEL.—Bids will be received by the Board of Education of Wilmington, until Nov. 14, for the installation of a complete lighting system in a public school and for wiring and fixtures for 25 lights in seven other schools.

BALTIMORE, MD. — The Chesapeake Paper Board Company, Key Highway and the Baltimore & Ohio Railroad, contemplates the construction of a power house. J. S. Smith is president.

BEL AIR, MD.—The Bel Air Electric Company, in co-operation with the Consolidated Gas, Electric Light & Power Company, Baltimore, plans to erect a pole line in the vicinity of the municipality to provide for increased service. The Consolidated company also contemplates a number of line improvements in this section.

BRISTOL, VA. — A company to be known as the Washington County Light & Power Company is being formed for the purpose of erecting a high-tension transmission line to connect with the lines of the Bristol Gas & Electric Company and extend along Abington Road.

North Central States

CHARLEVOIX, MICH.—Work has been started on extensions to the municipal electric power plant. John D. Curtis, Charlevoix, is in charge.

MASON, MICH.—The Consumers' Power Company has preparations under way for the installation of new lines in connection with improvements to the city lighting system, to cost about $20,000.

LOWELLVILLE, OHIO.—The Pennsylvania-Ohio Power & Light Company has work under way on the construction of an addition to the Lowellville power station to house an additional 20,000 hp. turbine generator, to provide for increased service. The installation of the new unit will bring the capacity of the local station up to 80,000 hp.

NEW RICHLAND, OHIO.—The County Commissioners have authorized the Belle Center (Ohio) Light & Power Company to erect an electric transmission line to New Richland, Logan County.

EAST CHICAGO, IND. — Bids will be received at the office of the Board of Public Works until Nov. 14 for the installation of a lighting system on parts of Grapevine Street and 142d Street. T. Y. Richards is clerk of the board.

KOKOMO, IND.—The J. M. Leach Manufacturing Company contemplates the construction of a one-story power house. Thomas McGraw, Citizens' Trust Building, is architect.

MITCHELL, IND.—E. E. Dean, Indianapolis, is negotiating for the purchase of the Mitchell Electric Light Plant, subject to the approval of the Indiana Public Service Commission. Arrangements have been made by Mr. Dean to operate the waterworks of the town.

WILLIAMS, IND.—Plans are under way by the Middle West Utilities Company, Williams, a subsidiary of the Southern Indiana Power Company, for a hydro-electric generating plant in Williams, to cost $80,000. Holland, Ackerman & Holland, Inc., 53 West Jackson Boulevard, Chicago, are engineers.

BELLEVILLE, ILL.—The City Council has adopted recommendation of the Lighting Committee providing for the installation of new street lamps. A municipally owned light plant is being agitated.

SHEBOYGAN, WIS.—The Ke No Company, manufacturer of furniture novelties and hardwood specialties, is planning the construction of a new power house, 25 ft. x 35 ft. W. C. Weeks is architect.

ADRIAN, MINN.—Bids, it is reported, will be received for extensions to the municipal electric power plant, consisting of one 150-kva. generator, one electric switchboard, etc.

SHELL ROCK, IOWA.—A company is being organized, it is understood, for the construction of a hydro-electric plant in Shell Rock, to cost about $100,000. W. M. Roe, Waverly, is interested. Holland, Ackerman & Holland, 53 West Jackson Boulevard, Chicago, are engineers.

EDINA, MO. — The Edina Light Company will extend its transmission lines to Gibbs and Labelle, at an early date. The company is also considering the installation of additional machinery at its plant, including a 300 hp. oil engine complete with generator. L. A. Nickell is secretary and treasurer.

MONTGOMERY CITY, MO. — The electric light plant and a portion of the ice plant of the Montgomery Ice & Electric Company were recently destroyed by fire. E. H. Algermissen is owner.

PARKVILLE, MO. — The Kansas City (Mo.) Light & Power Company is contemplating the erection of a transmission line from Parkville to Fairview.

SALISBURY, MO.—Plans are under consideration for the erection of a transmission line to Prairie Hill. The Council recently awarded contract for equipment for the proposed new municipal electric lighting plant to the General Electric Company, St. Louis.

SCOTTSBLUFF, NEB.—The Intermountain Railway, Light & Power Company contemplates the installation of 140 additional street lamps in Scottsbluff.

Southern States

HIGH POINT, N. C. — Work will be started soon by W. A. Davis and associates on the construction of an electrically operated ice-manufacturing plant, to cost $75,000.

RED SPRINGS, N. C.—The town authorities are considering issuing $50,000 in electric light and water bonds.

STANTONSBURG, N. C. — Plans are under consideration by the town authorities for the construction of an electric light system in Stantonsburg, to cost about $20,000. G. L. Hill is clerk.

LEESBURG, FLA. — The Grass Fibre Pulp & Paper Company plans to construct a power plant to be used in connection with its pulp and paper mill now under construction. E. R. Lacy is vice-president and manager.

WINGATE, N. C.—Arrangements are being made by the Town Commission for an appropriation of $10,000 for an electric lighting system in Wingate. A. C. Small is town clerk.

SAN ANTONIO, FLA.—Plans are under consideration for the establishment of an electric light plant in San Antonio, for which $6,000 in bonds have been voted. The project includes the extension of a transmission line from Dade City to San Antonio.

ROGERSVILLE, TENN.—Improvements and extensions to its plant are under consideration by the Rogersville Electric Company.

HAMMOND, LA.—Improvements and extensions to the lighting system in Hammond are under consideration by the City Council.

SHREVEPORT, LA.—The United States Sheet & Window Glass Company, Shreveport, is contemplating the erection of a large electric power plant for use in connection with its plant under construction at Jewella, near Shreveport. H. E. DeVaughn is chief engineer. The headquarters of the company are at Morgantown, W. Va.

BILLINGS, OKLA. — A high-tension transmission line will be erected to extend from a point on the main line of the Oklahoma Gas & Electric Company at Oklahoma City into Billings. This project is included in the plan to furnish several cities and towns in northwest Oklahoma with electricity from high-tension lines.

HOUSTON, TEX.—The Houston Light & Power Company is considering extensions to its electric generating plant, to cost about $500,000. S. R. Berton, Jr., is manager.

Pacific and Mountain States

TACOMA, WASH.—Work is under way by the Buffelin Lumber & Manufacturing Company on the construction of plant additions, to cost about $350,000, including electric power plant, veneer factory and planing mill.

CORVALLIS, ORE. — The Mountain States Power Company contemplates considerable construction work in Corvallis during the remainder of the year, to cost about $14,000. The company has completed the erection of a transmission line into the city at a cost of $20,000.

MEDFORD, ORE.—A new company is being organized by J. T. Gagnon, operator of a local lumber plant, for the construction of an electric power plant for commercial and industrial service, for which preliminary plans are under way.

LOS ANGELES, CAL.—Plans are under consideration by the Ward Baking Company for the construction of a baking plant to cost about $2,000,000. The installation will include power equipment, ovens, conveying apparatus and other electrical and mechanical equipment.

MANTECA, CAL.—The Pacific Gas & Electric Company, San Francisco, it is reported, is considering improvements to its local power house, including the installation of new machinery, to cost about $35,000.

SAN MATEO, CAL.—The installation of an electrolier system in San Mateo is under consideration. Stanley Whitehead is city engineer.

SHAFTER, CAL.—A petition has been presented to the Board of Supervisors for the installation of a lighting system in Shafter.

STOCKTON, CAL.—A petition has been submitted to the County Supervisors for the formation of the Lathrop Highway lighting district. E. Graham is clerk.

COLORADO SPRINGS, COL.—Tentative plans have been agreed upon for the installation of an ornamental lighting system from Nevada Avenue to the Broadmoor Hotel. Joseph I. Caldwell is city engineer.

Canada

BROCKVILLE, ONT. — The Eugene F. Philips Electrical Works, Ltd., Montreal, contemplate the construction of a plant to cost between $2,500,000 and $3,000,000. The company will secure electrical energy of between 1,000 hp. and 3,000 hp. from the Hydro-Electric Power Commission.

WATFORD, ONT.—The establishment of a hydro-electric and power distribution system, to cost about $50,000, is under consideration by the Warwick Township officials. For further information address N. Herbert, Watford.

Directory of Electrical Associations

Printed in the First Issue of Each Month

ALABAMA LIGHT AND TRACTION ASSOCIATION. Secretary-treasurer, J. P. Ross, Birmingham Railway, Light & Power Co., Birmingham, Ala.

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AMERICAN ASSOCIATION OF OPERATING ENGINEERS. Secretary, H. C. Bristol, Calderwood, Tenn.

AMERICAN ELECTRIC RAILWAY ASSOCIATION. Executive secretary, J. W. Welsh, 8 West 40th St., New York City.

AMERICAN ELECTROCHEMICAL SOCIETY. Acting secretary, A. D. Spillman, Lehigh University, Bethlehem, Pa.

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AMERICAN PHYSICAL SOCIETY. Secretary, Dayton C. Miller, Case School of Applied Science, Cleveland, Ohio. Annual meeting Toronto, Dec. 27.

AMERICAN SOCIETY FOR TESTING MATERIALS. Secretary-treasurer, C. L. Warwick, 1315 Spruce St., Philadelphia, Pa.

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ARKANSAS UTILITIES ASSOCIATION. Secretary, R. I. Brown, Little Rock Railway & Electric Company, Little Rock, Ark.

ASSOCIATED MANUFACTURERS OF ELECTRICAL SUPPLIES. General secretary, C. E. Dustin, 30 East 42nd St., New York City.

ASSOCIATION OF EDISON ILLUMINATING COMPANIES. Secretary, Preston S. Millar, 80th St. & East End Ave., New York City.

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ASSOCIATION OF MUNICIPAL ELECTRICAL UTILITIES OF ONTARIO. Secretary, S. R. A. Clement, 190 University Ave., Toronto.

ASSOCIATION OF RAILWAY ELECTRICAL ENGINEERS. Secretary-treasurer, Joseph A. Andreucetti, Chicago & Northwestern Railway, Room 413, C. & N. W. Terminal Station, Chicago, Ill.

BRITISH COLUMBIA ELECTRICAL CO-OPERATIVE ASSOCIATION. Field Manager, R. E. Chatfield, 108 B. C. Electric Bldg., Vancouver, B. C.

CANADIAN ELECTRICAL ASSOCIATION, affiliated with N. E. L. A. Secretary-treasurer, Eugene Vinet, Shawinigan Water & Power Co., Montreal, Canada.

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CONFERENCE CLUB. Secretary, Sullivan W. Jones, 19 West 44th St., New York City.

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ELECTRIC FURNACE ASSOCIATION. Secretary, Dr. C. G. Schluederberg, Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa.

ELECTRIC POWER CLUB. Secretary, C. H. Roth, 1410 West Adams St., Chicago, Ill.

ELECTRICAL MANUFACTURERS' CLUB. Secretary, F. L. Bishop, Hartford Faience Co., Hartford, Conn. Convention, Hot Springs, Va., Nov. 9-13.

ELECTRICAL MANUFACTURERS' COUNCIL. Executive secretary, Frederic Nicholas, 522 Fifth Ave., New York City.

ELECTRICAL SAFETY CONFERENCE. Secretary, Dana Pierce, 25 City Hall Place, New York City.

ELECTRICAL SUPPLY JOBBERS' ASSOCIATION. General secretary, Franklin Overbagh, 411 South Clinton St., Chicago, Ill.

ELECTRICAL SUPPLY JOBBERS' ASSOCIATION, ATLANTIC DIVISION. Secretary, E. Donald Tolles, 165 Broadway, New York City.

ELECTRICAL SUPPLY JOBBERS' ASSOCIATION, PACIFIC COAST DIVISION. Secretary, Albert H. Elliot, 502 Flatiron Building, San Francisco, Cal. Convention, Del Monte, Nov. 10-12.

ELECTRICAL TRADE ASSOCIATION OF CANADA. Secretary, William R. Stavely, Royal Insurance Building, Montreal, Canada.

EMPIRE STATE GAS AND ELECTRIC ASSOCIATION. Secretary, Charles H. B. Chapin, Grand Central Terminal Building, New York City.

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INSTITUTE OF RADIO ENGINEERS. Secretary, Alfred N. Goldsmith, College City of New York, New York.

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INTERNATIONAL ELECTROTECHNICAL COMMISSION (international body representing various national electrical engineering societies contributing to its support). General secretary, C. le Maistre, 28 Victoria St., Westminister, London, S. W., England.

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NATIONAL ASSOCIATION OF ELECTRICAL CONTRACTORS AND DEALERS. Secretary, Farquson Johnson, 15 West 37th St., New York City, N. Y. State associations in Alabama, Arkansas, Connecticut, Georgia, Kansas, Illinois, Indiana, Iowa, Louisiana, Maryland, Massachusetts, Michigan, Minnesota, Missouri, New Jersey, New York, Ohio, Oregon, Pennsylvania, Tennessee and Wisconsin. Also members in Canada and unorganized states.

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NATIONAL ASSOCIATION OF ELECTRICAL INSPECTORS. Executive Secretary, T. H. Day, 59 Deerfield Ave., Hartford, Conn.

NATIONAL ASSOCIATION OF RAILWAY AND UTILITY COMMISSIONERS. Secretary, James B. Walker, New York Transit Commission, New York City.

NATIONAL ELECTRIC LIGHT ASSOCIATION. Executive manager, M. H. Aylesworth, 29 West 39th St., New York City.

NATIONAL ELECTRICAL CREDIT ASSOCIATION. Secretary, Frederic P. Vose, 1350 Marquette Building, Chicago, Ill.

NATIONAL FIRE PROTECTION ASSOCIATION. Chairman of electrical committee, Dana Pierce, 25 City Hall Place, New York City. Secretary of electrical committee, Ralph Sweetland, 141 Milk St., Boston, Mass.

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NEW ENGLAND ELECTRICAL CREDIT ASSOCIATION. Secretary, James A. Loring, 161 Devonshire St., Boston, Mass.

NEW ENGLAND GEOGRAPHIC DIVISION, N. E. L. A. Secretary, Miss O. A. Bursiel, 149 Tremont St., Boston, Mass.

NEW MEXICO ELECTRICAL ASSOCIATION. Secretary-treasurer, Charles E. Twogood, Albuquerque, N. M.

NEW YORK ELECTRICAL CREDIT ASSOCIATION. Secretary, W. J. Kreger, 47 West 34th St., New York City.

NEW YORK ELECTRICAL SOCIETY. Secretary, George H. Guy, 29 West 39th St., New York City.

NORTH CENTRAL ELECTRIC ASSOCIATION, GEOGRAPHIC DIVISION, N. E. L. A. Secretary, H. E. Young, Minneapolis General Electric Co.. Minneapolis.

NORTHWEST GEOGRAPHIC DIVISION, N. E. L. A. Secretary-treasurer, J. F. Orr, Idaho Power Co., Boise, Idaho.

OHIO ELECTRIC LIGHT ASSOCIATION. Secretary, D. L. Gaskill, Greenville, Ohio.

OKLAHOMA UTILITIES ASSOCIATION. Manager, H. A. Lane, 1106 First National Bank Bldg., Oklahoma City.

ONTARIO ASSOCIATION OF ELECTRICAL CONTRACTORS AND DEALERS. Secretary, J. A. McKay, 24 Adelaide St., West, Toronto, Ont.

PACIFIC COAST GEOGRAPHIC DIVISION, N. E. L. A. Secretary, S. H. Taylor, 527 Rialto Bldg., San Francisco, Cal.

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SOCIETY FOR ELECTRICAL DEVELOPMENT, INC. Assistant to the president, W. L. Goodwin; secretary-treasurer, R. F. Paige, 522 5th Ave., New York City. Annual meeting second Tuesday in May; directors' meetings second Tuesday in May and November; executive committee meetings every sixty days.

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WESTERN SOCIETY OF ENGINEERS, ELECTRICAL SECTION. Secretary, E. S. Nethercut, 1735 Monadnock Block, Chicago, Ill.

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